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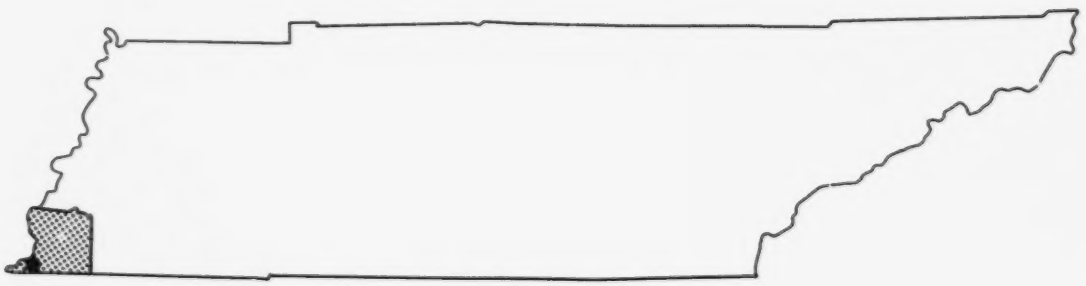
ORIGINAL

FLOOD INSURANCE STUDY

COMPLETED
112

CITY OF MEMPHIS, TENNESSEE
SHELBY COUNTY



JUNE 1, 1982

Federal Emergency Management Agency

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PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index
Flood Insurance Rate Map

FLOOD INSURANCE STUDY
CITY OF MEMPHIS, TENNESSEE

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Memphis, Shelby County, Tennessee, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert the City of Memphis to the regular program of flood insurance by the Federal Emergency Management Agency (FEMA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these Federally-supported studies are based. These criteria take precedence over the minimum Federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.3 (d). In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgments

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Army Corps of Engineers (COE), Memphis District, for the Federal Emergency Management Agency, under Contract No. IAA-H-18-78 Order No. 7. This study was completed in June 1980, and covered all significant flooding sources in the City of Memphis.

1.3 Coordination

Identification of streams requiring detailed study was done in meetings attended by personnel of COE, Memphis District , FEMA, and officials of the City of Memphis.

On January 15, 1981 the results of the study were reviewed at the final meeting attended by representatives of the study contractor, FEMA, and community officials. The study was acceptable to the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the City of Memphis. The area of study is shown on the Vicinity Map (Figure 1).

The areas studied by detailed methods were selected with priority given to all known flood hazard areas, and areas of projected development or proposed construction for the next five years, through 1985.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to and agreed upon by FEMA, and the community.

2.2 Community Description

The City of Memphis began as a river port on the banks of the Mississippi River. The Chickasaw Bluff upon which the original settlement was built provided security from the annual high water experienced on the river. The city has continued to grow and is currently the largest on the river between St. Louis, Missouri and New Orleans, Louisiana. Memphis has a population of 623,530 (1970 Census Survey) and covers an area around 225 square miles. Its geographic position and excellent transportation facilities have made it the primary service distribution center for the entire Mid-South area.

As Memphis grew, it spread toward the east. Expansion was hindered on the north by the Wolf River and on the south by Nonconnah Creek. As distances from the central business district to the fringe of urban development increased, the advantages of being more centrally located helped to encourage development of open flood plain lands. The flood plain along Nonconnah Creek is the most highly developed flood prone area with increasing encroachments. The development pressures toward urbanization have grown to the extent that flood prone lands along the Wolf and Loosahatchie Rivers and the smaller tributary streams are also being increasingly developed into commercial, industrial, and residential uses.

The mean annual temperature in the Memphis area is 62 degrees F. January is the coldest month with an average temperature of about 41 degrees F, and July is the warmest month with an average of 81 degrees F. Recorded extremes are 106 degrees F and minus 13 degrees F. The average annual rainfall is about 50 inches with normal monthly rainfall varying from an average of three inches in October to more than five inches in March.

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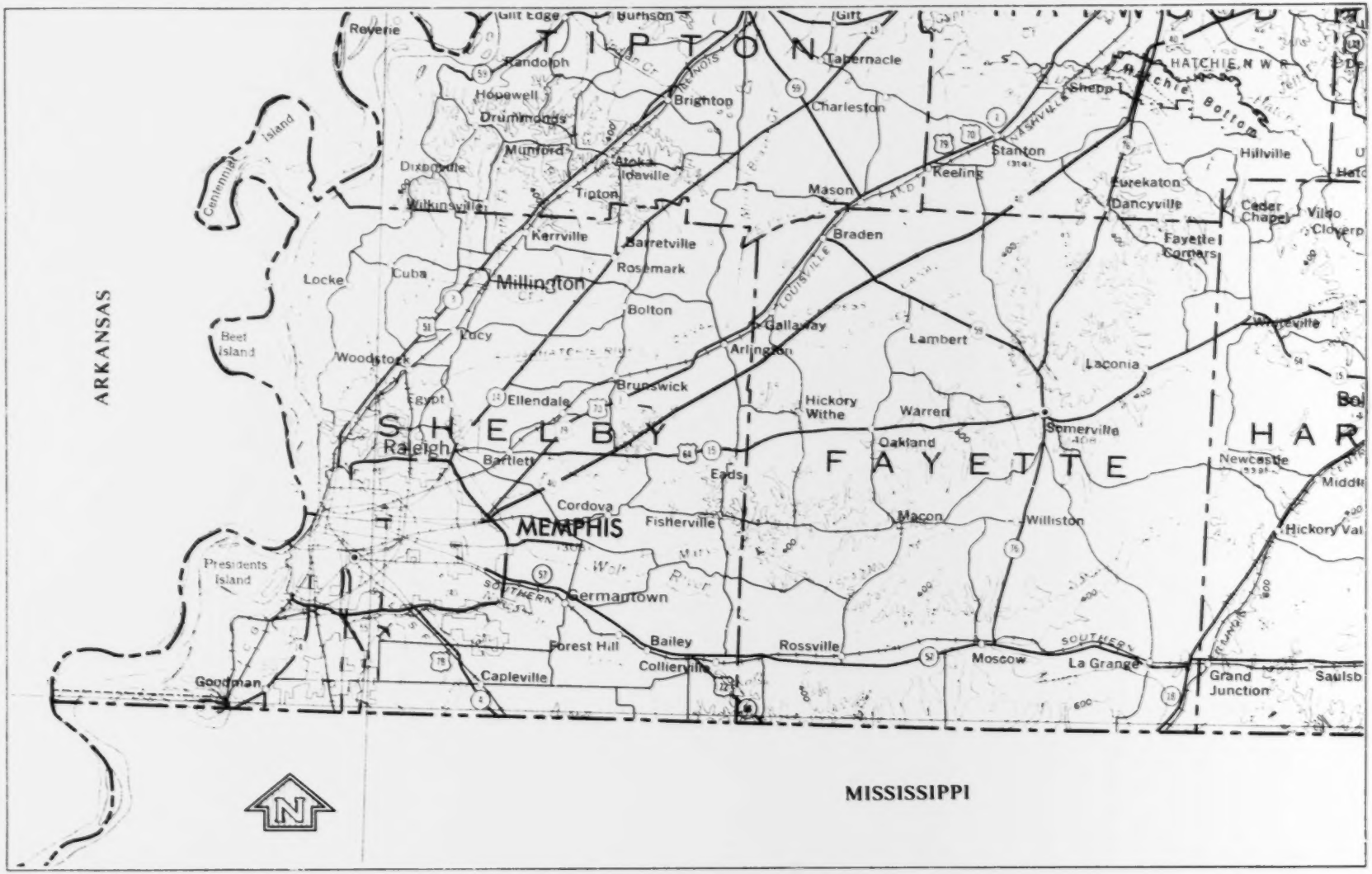


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

APPROXIMATE SCALE

8 0 8 16 24 MILES

VICINITY MAP

2.3 Principal Flood Problems

Major floods have occurred on November 21, 1934, when 10.48 inches of rain fell over the Memphis area in 24 hours, and on May 9, 1958, after 4.76 inches of rain fell in approximately eight hours. In 1934 there was little development in the Nonconnah Creek flood plain and damage was not extensive. In the 1958 flood many homes and other property along Nonconnah Creek were damaged. Flood damages along the Wolf and Loosahatchie Rivers have also occurred. Based on past flooding and on flood plain information reports prepared by the U.S. Department of Agriculture, Soil Conservation Service, the city is aware of some of the flood problems and have adopted some flood damage preventative measures such as required building elevations and open floodway areas. Flood plain lands are being filled and developed, resulting in increased threat of severe flooding on lands previously undeveloped.

2.4 Flood Protection Measures

The low-lying lands along the Mississippi River are protected from Mississippi River flooding by a flood control system consisting of levees, floodwalls, floodgates, and pumping stations. This system involves the extension of levees and/or floodwalls along the lower reaches of the Wolf River and Nonconnah Creek. The stream channels of the Loosahatchie River, Wolf River, and Nonconnah Creek have had some major realignment and enlargement in the past. These channel improvements were generally designed to carry flows resulting from floods of less magnitude than the 10-year frequency flood. Therefore, their carrying capacities are inadequate to contain within banks the flood flows of the four frequency floods considered in this study.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, and 500-year period (recurrence intervals), have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one percent chance of annual occurrence) in any 50 year period is about 40 percent (four in 10), and for any 90 year period, the risk increases to about 60 percent (six in 10). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail in the community.

Frequency-discharges were developed for each basin using the COE's HEC-1 computer program (Reference 1). The basins were divided into sub-areas, and synthetic unit hydrographs were developed for each sub-area using Snyder's method as described in EM 1110-2-1405 (Reference 2).

The increase in peak discharges in the upstream direction for some streams in "Summary of Discharges" Table 1, is caused by storage in overbank areas and behind hydraulic structures.

Rainfall frequency values were determined from National Weather Service Technical Paper No. 40 (Reference 3) for the 10-, 50-, and 100-year frequency rainfalls. A corresponding 500-year frequency rainfall was determined by extrapolating the 10-, 50-, and 100-year frequency rainfall depths for given durations. Rainfall losses for the Nonconnah Creek and the Loosahatchie River basins were based on initial and uniform loss rates. Rainfall losses for the Wolf River Basin were based on the Soil Conservation Service land use and runoff curves. The rainfall excess was applied to each unit hydrograph to obtain the flood hydrograph for each sub-area. The flood hydrographs were combined and routed using the modified Puls method.

No discharges were computed during this study for the Mississippi River. Discharges developed from previous unpublished studies of the Mississippi River by the COE, Memphis District, were used for the 10-, 50-, and 100-year floods.

The 500-year frequency flood discharges and corresponding flood elevation on the Mississippi River within the study area were not determined due to the difficulty in analyzing a specified flood frequency of this magnitude in such a large and unique drainage basin. Because of the unusually large drainage area involved (932,800 square miles at Memphis) and the relatively short period of record under regulated conditions, it is reasonable to assume that all critical combinations of storms and runoff events have not been observed. The sequence and severity of meteorological and hydrological events which could reasonably be expected to occur and cause a major flood, such as the 500-year frequency flood, would involve the consideration of storm transpositions, storm adjustments, seasonal variations, storm mechanics, and the determination of the feasibility of the occurrence of the events, as well as the determination of flows under natural conditions and as regulated by reservoirs at key stations on the tributaries and on the main Mississippi River. In place of the 500-year storm, the project design flood has been used to represent a storm of larger magnitude than the 100-year flood.

The project design flood is a hypothetical flood developed as a guide for the construction of flood control structures on the Mississippi River. Frequency has not been assigned to the project flood; however, it is well in excess of 100-years.

The peak discharge-drainage area relationships for the selected recurrence intervals are presented in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
MISSISSIPPI RIVER					
Memphis southern corporate limits	932,800.0	1,435,000	1,810,000	1,960,000	*
WOLF RIVER					
At mouth	871.1	23,510	35,520	40,420	51,900
Jackson Avenue (W8)	772.9	23,860	36,050	41,050	53,760
Walnut Grove Road (W13)	710.1	24,090	36,160	41,060	53,360
WOLF RIVER LATERAL A					
At mouth	1.9	590	770	850	1,000
WOLF RIVER LATERAL AA					
At mouth	1.0	1,110	1,440	1,580	1,840
WOLF RIVER LATERAL M					
At mouth	2.0	800	1,000	1,070	1,220
FLETCHER CREEK					
At mouth	31.8	6,470	7,940	8,540	9,780
Whitten Road	22.2	6,910	8,590	9,200	10,430
FLETCHER CREEK LATERAL B					
At mouth	4.1	1,150	1,530	1,680	1,960
HARRINGTON CREEK					
At mouth	12.0	2,130	2,530	2,670	2,970
Raleigh-LaGrange Road	9.5	3,530	3,890	4,040	4,390
HARRINGTON CREEK LATERAL B					
At mouth	1.1	925	1,208	1,320	1,547

*Discharge not computed for 500-year flood.

TABLE 1 - SUMMARY OF DISCHARGES - cont.

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
CYPRESS CREEK					
Levi Street	6.4	4,000	5,111	5,707	7,201
Neely Road	1.28	3,641	4,814	5,413	6,887
NONCONNAH CREEK					
Horn Lake Road	180.3	29,743	35,404	38,251	45,601
Nonconnah Blvd.	157.5	25,658	31,911	34,858	42,305
DAYS CREEK					
Brooks Road	9.21	8,530	11,220	12,590	15,990
HURRICANE CREEK					
Democrat Road	7.70	2,806	3,026	3,752	6,062
Christine Road	5.36	4,117	5,366	5,983	7,509
TENMILE CREEK					
Getwell Road	7.78	6,654	8,091	8,827	10,640
Raines Road	2.99	2,316	2,899	3,198	3,845
TENMILE CREEK LATERAL A					
Winchester Road	0.70	675	888	997	1,265
JOHN'S CREEK					
Cottonwood Road	25.34	11,594	14,040	15,172	17,435
HOWARD ROAD OUTFALL					
Quina Road	3.12	2,231	2,925	3,326	4,284
Stout Road	0.38	338	444	633	20

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding sources studied in detail in the city were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of the flood sources.

Aerial photographs of the City of Memphis were flown in January 1976. Cross section data and spot elevations within the flood plains were obtained by field surveys in June 1976 and September 1977.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). The location and length of the cross sections are shown on the Flood Boundary and Floodway Map (Exhibit 3).

Manning's roughness coefficients were estimated by field inspection and ranged from 0.035 to 0.09 for earth channels and from 0.05 to 0.12 for overbank areas.

Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals (Exhibit 1). Water-surface profiles were developed using the computer program HEC-2, "Water-Surface Profiles" (Reference 4). This program uses the backwater standard step method for natural channels and contains elaborate routines for evaluating head losses at bridges and culverts. Starting water-surface elevations were obtained from concurrent studies prepared by the U.S. Army Corps of Engineers and the Soil Conservation Service.

Water-surface profiles for the Mississippi River were based on profiles developed by the COE (unpublished data) using the Mississippi River Basin Model and stage frequency curves derived for each stream gaging station.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference mark data, including both existing bench marks and other significant elevation reference marks developed during the study, are shown and described on the maps.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by FEMA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and the 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:12,000, with 10 foot contour intervals. In cases where the 100- and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

Small areas within the flood boundaries may be above the flood elevations and therefore not be subject to flooding; owing to limitations of the map scale, such areas are not shown.

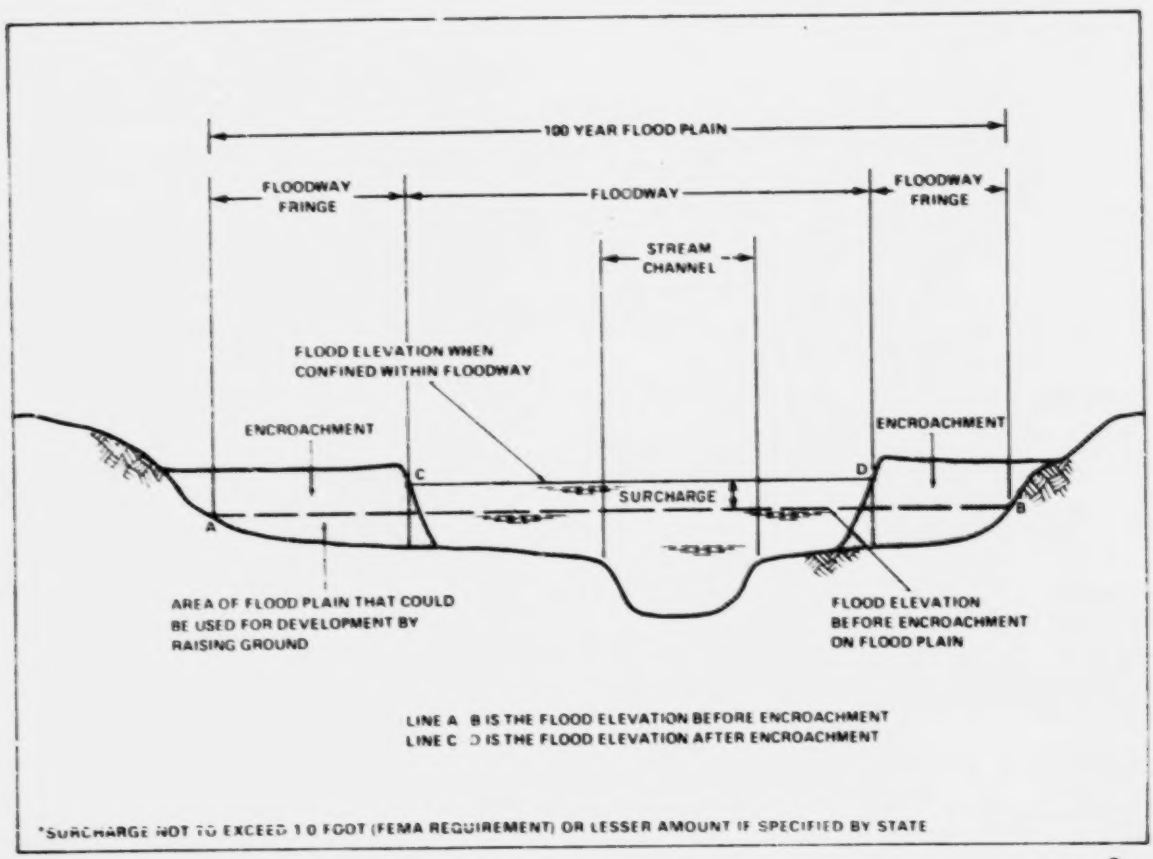
4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of FEMA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this report are presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The floodway presented in this study was computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway was computed (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 3), the floodway boundaries were determined at cross sections; between cross sections, the boundaries were interpolated.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FLOODWAY SCHEMATIC

Figure 2

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Wolf River								
A	0.71	800	15,200	2.7	233.4	215.7[2]	216.6[2]	0.9
B	1.44	950	9,320	4.3	233.5	216.5[2]	217.4[2]	0.9
C	2.14	2,800	39,419	1.0	233.8	221.4[2]	222.4[2]	1.0
D	3.27	800	10,340	3.9	233.8	221.8[2]	222.8[2]	1.0
E	4.12	900	11,180	3.6	234.0	223.0[2]	224.0[2]	1.0
F	5.28	770	9,076	4.5	234.3	224.9[2]	225.9[2]	1.0
G	6.09	1,200	11,880	3.4	234.8	227.1[2]	227.9[2]	0.8
H	7.40	1,000	9,168	4.5	235.7	230.3[2]	231.3[2]	1.0
I	9.33	850	9,866	4.2	238.0	235.6[2]	236.5[2]	0.9
J	10.77	4,050	18,515	2.2	240.2	240.1[2]	241.1[2]	1.0
K	11.80	1,100	11,600	3.6	243.9	242.8[2]	243.8[2]	1.0
L	13.13	1,050	8,680	4.7	246.3	246.3	247.1	0.8
M	13.37	1,050	12,180	3.4	248.3	248.3	249.3	1.0
N	13.82	3,500	32,390	1.3	249.3	249.3	250.3	1.0
O	15.65	1,050	7,000	5.9	252.4	252.4	253.1	0.7
P	16.76	3,140	24,272	1.6	255.3	255.3	256.2	0.9
Q	18.18	3,170	19,910	2.1	258.5	258.5	259.3	0.8
R	19.13	800	9,575	4.3	261.6	261.6	262.4	0.8
Wolf River Lateral A								
A	0.43	240	894	1.1	259.1	259.1	260.1	1.0

[1]Miles above diversion channel outlet for Wolf River and miles above mouth for Wolf River Lateral A
[2]Elevations computed without consideration of backwater effects.

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN

(SHELBY CO.)

FLOODWAY DATA

WOLF RIVER-WOLF RIVER LATERAL A

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						(FEET NGVD)		
Wolf River Lateral AA								
A	0.04	340	1,066	1.5[2]	258.2	258.2	258.5	0.3
B	0.48	30	115	13.6[2]	270.0	270.0	270.0	0.0
C	0.78	90	253	6.2[2]	275.3	275.3	275.5	0.2
D	0.90	20	127	12.4[2]	280.2	280.2	280.5	0.3
Wolf River Lateral M								
A	0.58	25	200	5.4	239.7	238.0[3]	239.0[3]	1.0
B	0.89	25	206	5.2	242.5	242.5	242.8	0.3
C	0.98	25	188	5.7	244.9	244.9	245.1	0.2
D	1.04	30	166	6.5	247.7	247.7	248.3	0.6
E	1.22	20	210	5.1	251.1	251.1	251.4	0.3
F	1.43	20	177	8.4	255.4	255.4	255.6	0.2
G	1.57	20	253	5.8	259.1	259.1	259.2	0.1
H	1.61	20	278	5.3	260.1	260.1	260.3	0.2
I	2.22	280	1,201	1.1	276.0	276.0	277.0	1.0
Fletcher Creek								
A	0.59	100	1,563	5.7	245.8	245.8	246.7	0.9
B	0.98	120	1,494	5.7	248.0	248.0	248.9	0.9
C	1.42	210	1,477	6.6	251.5	251.5	252.5	1.0
D	2.75	749	4,917	1.9	258.3	258.3	259.0	0.7
E	2.80	835	5,483	1.7	258.4	258.4	259.1	0.7
F	3.11	984	4,610	2.0	259.6	259.6	260.3	0.7

[1]Miles above mouth.
[2]High velocities due to concrete lined channel.
[3]Elevations computed without consideration of backwater effects.

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN

(SHELBY CO.)

FLOODWAY DATA

WOLF RIVER TRIBUTARY AA-WOLF RIVER LATERAL M-FLETCHER CREEK

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE
Fletcher Creek Lateral B								
A	0.27	70	640	2.4	260.8	260.8	261.8	1.0
Harrington Creek								
A	1.02	110	782	5.1	239.9	239.2[4]	240.0[4]	0.8
B	1.33	130	628	6.3	240.7	240.7	241.0	0.3
C	1.61	100	743	5.4	242.0	242.0	242.6	0.6
D	2.10	420	866	4.6	248.9	248.9	249.5	0.6
E	2.37	340/300[2]	1,978	2.0	251.0	251.0	252.0	1.0
Harrington Creek Lateral B								
A[3]	0.03	250	571	2.3	257.7	256.9[4]	257.8[4]	0.9
B	0.28	140	421	3.1	261.4	261.4	262.2	0.8
Cypress Creek								
A	0.19	175	1,265	7.65	224.9	202.5[4]	202.5[4]	0.0
B	0.62	98	899	10.75	224.9	218.7[4]	218.7[4]	0.0
C	0.64	100	1,229	7.87	224.9	220.6[4]	220.6[4]	0.0
D	0.90	92	1,186	8.16	224.9	222.5[4]	222.5[4]	0.0
E	1.12	113	1,270	7.61	226.0	226.0	227.0	1.0
F	1.56	831	8,063	1.20	228.8	228.8	229.6	0.8
G	2.05	511	3,397	2.99	230.1	230.1	231.0	0.9
H	2.52	267	1,898	3.01	235.3	235.3	235.8	0.5
I	3.12	58	768	7.44	237.7	237.7	238.7	1.0
J	3.48	54	593	9.63	238.3	238.3	239.3	1.0

[1]Miles above mouth.
[2]Total width/width within corporate limits.
[3]Floodway outside corporate limits, not shown on map.
[4]Elevations computed without consideration of backwater effects.

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN

(SHELBY CO.)

FLOODWAY DATA

FLETCHER CREEK LATERAL B-HARRINGTON CREEK-HARRINGTON CREEK LATERAL B-CYPRESS CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Cypress Creek cont.								
K	3.53	54	602	9.48	239.0	239.0	240.0	1.0
L	3.70	46	453	12.98	239.7	239.7	240.7	1.0
M	4.39	293	1,542	3.82	252.1	252.1	253.1	1.0
N	4.69	36	457	11.84	254.6	254.6	255.6	1.0
O	5.06	32	349	15.52	257.6	257.6	257.6	0.0
Nonconnah Creek								
A	0.11	495	6,270	6.15	224.9	211.2[2]	211.2[2]	0.0
B	0.76	600	8,736	4.41	225.7	213.8[2]	214.8[2]	1.0
C	1.23	609	9,672	3.99	225.9	215.4[2]	216.2[2]	0.8
D	1.76	200	4,162	9.27	226.6	219.9[2]	220.6[2]	0.7
E	2.06	645	6,276	6.10	227.2	224.4[2]	225.2[2]	0.8
F	2.59	155	4,306	8.88	230.1	230.1	231.1	1.0
G	3.45	1,150	28,790	1.28	232.3	232.3	233.3	1.0
H	4.14	381	10,114	3.81	232.6	232.6	233.6	1.0
I	4.46	190	4,373	8.82	233.7	233.7	234.7	1.0
J	4.96	972	10,087	3.82	237.1	237.1	238.1	1.0
K	5.72	480	10,821	3.57	239.1	239.1	240.1	1.0
L	6.79	520	6,568	5.31	242.2	242.2	243.2	1.0
M	7.22	1,475	5,949	5.87	245.0	245.0	246.0	1.0
N	7.74	571	10,191	3.43	248.3	248.3	249.3	1.0
O	8.49	400	6,078	5.08	249.8	249.8	250.8	1.0
P	8.87	370	4,575	6.97	252.0	252.0	253.0	1.0
Q	9.46	1,320	15,644	2.04	255.3	255.3	256.1	0.8
R	10.11	225	4,196	6.25	257.6	257.6	258.6	1.0
S	10.71	641	7,240	3.62	260.0	260.0	260.9	0.9

[1]Miles above mouth.
[2]Elevations computed without consideration of backwater effects.

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

FLOODWAY DATA

CYPRESS CREEK-NONCONNAH CREEK

BEST DOCUMENT AVAILABLE

BEST DOCUMENT AVAILABLE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Nonconnah Creek cont.								
T	11.53	250	4,413	6.11	263.9	263.9	264.9	1.0
U	11.91	400	6,267	4.30	265.8	265.8	266.8	1.0
V	12.59	340	4,497	4.48	268.2	268.2	269.2	1.0
W	13.60	1,028	6,237	3.23	272.3	272.3	273.3	1.0
X	14.40	510	6,238	3.44	274.9	274.9	275.7	0.8
Y	14.86	100[2]	1,592	13.45	277.0	277.0	277.2	0.2
Z	15.60	713[2]	5,839	3.70	283.4	283.4	284.2	0.8
AA	17.34	210[2]	3,576	4.82	291.6	291.6	292.6	1.0
Days Creek								
A	0.18	100	874	14.4	239.5	227.2[3]	227.2[3]	0.0
B	0.48	80	931	13.5	239.5	233.3[3]	233.3[3]	0.0
C	0.54	118	947	13.3	239.5	233.7[3]	233.7[3]	0.0
D	0.59	90	1,036	12.2	239.5	235.0[3]	235.0[3]	0.0
E	0.81	170	1,891	6.7	242.1	242.1	242.1	0.0
F	1.04	95	1,488	7.8	244.8	244.8	245.8	1.0
G	1.37	88	954	12.2	244.8	244.8	245.8	1.0
H	1.88	105	1,001	11.6	247.7	247.7	248.1	0.4
I	1.96	80	990	8.2	249.5	249.5	249.7	0.2
J	2.47	69	1,102	7.4	256.6	256.6	257.0	0.4
K	2.71	95	879	9.2	257.2	257.2	258.2	1.0
L	3.07	96	1,142	7.1	265.0	265.0	265.3	0.3
M	3.09	96	1,194	6.8	265.3	265.3	265.6	0.3
N	3.51	200	1,362	4.2	266.4	266.4	267.4	1.0

[1]Miles above mouth.
[2]Floodway width extends beyond corporate limits
[3]Elevations computed without consideration of backwater effects

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN

(SHELBY CO.)

FLOODWAY DATA

NONCONNAH CREEK-DAYS CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Hurricane Creek								
A	0.11	73	488	7.69	248.4	233.0[2]	233.0[2]	0.0
B	0.35	78	474	7.92	248.4	243.1[2]	243.1[2]	0.0
C	0.41	82	561	6.69	248.4	245.1[2]	245.1[2]	0.0
D	0.67	96	613	6.12	249.4	249.4	249.4	0.0
E	0.88	78	733	5.12	253.9	253.9	253.9	0.0
F	1.28	87	684	5.49	265.2	265.2	265.3	0.1
G	1.51	76	1,387	4.09	265.5	265.5	266.2	0.7
H	1.72	45	809	7.39	265.5	265.5	265.9	0.4
I	2.06	45	677	8.84	266.2	266.2	266.7	0.5
J	2.55	81	803	5.45	273.1	273.1	273.2	0.1
K	3.20	137	807	5.42	287.4	287.4	288.4	1.0
Tenmile Creek								
A	0.47	450	2,611	3.38	255.4	254.2[2]	255.2[2]	1.0
B	0.97	396	2,125	4.15	261.3	261.3	261.3	0.0
C	1.35	42	600	13.38	262.7	262.7	263.7	1.0
D	1.47	42	657	13.43	264.4	264.4	265.4	1.0
E	2.05	34	303	15.98	266.7	266.7	266.9	0.2
F	2.41	36	295	16.46	272.5	272.5	272.5	0.0
G	2.60	29	248	12.92	277.8	277.8	277.8	0.0
H	3.11	72	679	4.71	290.6	290.6	290.6	0.0
I	3.30	44	599	5.34	299.1	299.1	299.3	0.2
J	3.38	24	496	6.45	303.4	303.4	303.8	0.4
K	3.45	163	1,778	1.80	304.3	304.3	304.9	0.6
L	3.53	67	849	3.78	304.6	304.6	305.0	0.4
M	3.68	26	426	7.51	304.7	304.7	305.5	0.8
N	3.76	553	1,893	1.46	304.9	304.9	305.9	1.0

[1]Miles above mouth.
[2]Elevations computed without consideration of backwater effects.

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN

(SHELBY CO.)

FLOODWAY DATA

HURRICANE CREEK-TENMILE CREEK

BEST DOCUMENT AVAILABLE

BEST DOCUMENT AVAILABLE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Tenmile Creek cont.								
O_2	4.14	24	309	8.92	307.8	307.8	308.5	0.7
P_3	4.68	187	943	2.19	318.7	318.7	319.7	1.0
Q_3	5.07	31	374	5.52	330.2	330.2	330.2	0.0
R	5.70	265	1,429	1.44	339.0	339.0	339.0	0.0
Tenmile Creek Lateral A								
A	0.44	45	399	2.50	286.4	286.4	286.4	0.0
B	1.08	25	91	11.01	304.4	304.4	305.0	0.6
John's Creek								
A	0.49	195	2,743	5.53	266.6	262.7[4]	263.7[4]	1.0
B	0.86	116	1,573	9.65	267.6	265.7[4]	266.4[4]	0.7
C	0.90	132	1,289	11.77	267.7	265.4[4]	266.2[4]	0.8
D	1.17	129	1,613	9.41	269.2	267.3[4]	268.3[4]	1.0
E	1.70	103	1,146	13.24	270.4	270.1[4]	270.6[4]	0.5
F	1.93	118	1,136	13.36	271.3	271.3	271.6	0.3
G	2.20	606	3,937	3.76	281.4	281.4	282.4	1.0
H	2.56	419	4,035	3.16	285.7	285.7	286.7	1.0
I	3.17	715/390[5]	3,372	3.45	289.5	289.5	290.5	1.0
J	3.67	106	1,839	6.34	294.8	294.8	295.6	0.8
Howard Road Outfall								
A	0.43	420	3,103	1.10	284.4	284.4	284.7	0.3
B	1.10	33	372	8.56	289.2	289.2	290.1	0.9

[1]Miles above mouth
[2]Outside corporate limits
[3]Outside corporate limits, not shown on map
[4]Elevations computed without consideration of backwater effects
[5]Total width/width within corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN

(SHELBY CO.)

FLOODWAY DATA

TENMILE CREEK-TENMILE CREEK LATERAL A-JOHN'S CREEK-HOWARD ROAD OUTFALL

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE
Howard Road Outfall Cont.								
C[2]	1.74	348	1,275	2.49	297.8	297.8	298.8	1.0
D[2]	2.28	40	251	5.77	305.3	305.3	306.3	1.0
E[2]	2.53	340	984	1.60	311.6	311.6	312.1	0.5
F[2]	3.00	20	125	4.00	320.3	320.3	321.3	1.0
Loosahatchie River								
A[2]	0.05	2300/170[3]	19,426	3.1	234.0	225.8[4]	226.8[4]	1.0
B[2]	0.87	4,480	47,564	1.3	234.0	227.1[4]	228.1[4]	1.0
C[2]	1.74	2,910	46,849	1.3	234.0	227.7[4]	228.7[4]	1.0
D[2]	2.81	3,830	72,419	0.8	234.0	228.1[4]	229.1[4]	1.0
E[2]	4.01	4,120	65,631	0.9	234.0	228.4[4]	229.4[4]	1.0
F[2]	5.10	970	20,699	2.8	234.0	228.8[4]	229.8[4]	1.0
G	5.39	2580/1380[3]	45,540	1.3	234.0	229.4[4]	230.4[4]	1.0
H[2]	8.74	2,840	47,558	1.1	234.0	230.6[4]	231.6[4]	1.0
I	9.10	2640/2590[3]	45,224	1.2	234.0	231.0[4]	232.0[4]	1.0
J	10.08	4210/4060[3]	15,090	3.7	234.0	231.5[4]	232.2[4]	0.7
K	10.98	800/220[3]	12,459	4.5	234.0	232.7[4]	233.6[4]	0.9
L	11.13	2720/1350[3]	37,073	1.5	234.0	233.6[4]	234.4[4]	0.8
M	11.47	4360/1780[3]	55,202	1.0	234.1	234.1	235.0	0.9

[1] Miles above mouth
[2] Outside corporate limits, not shown on map
[3] Total width/width within corporate limits
[4] Elevations computed without consideration of backwater effects

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN

(SHELBY CO.)

FLOODWAY DATA

HOWARD ROAD OUTFALL-LOOSAHATCHIE RIVER

BEST DOCUMENT AVAILABLE

BEST DOCUMENT AVAILABLE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE
Loosahatchie River (cont.)								
N	12.93	3540/ 950[2]	46,747	1.2	235.7	235.7	236.6	0.9
O	13.33	860/360[2]	12,140	4.6	236.5	236.5	237.4	0.9

[1]Miles above mouth.
[2]Total width/width within corporate limits.

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN

(SHELBY CO.)

FLOODWAY DATA

LOOSAHATCHIE RIVER

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, FEMA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for each significant flooding source affecting the City of Memphis, Tennessee.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet

Twenty-nine reaches meeting the above criteria were required for flooding sources of Memphis. The location of the reaches is shown in Exhibit 1 (Flood Profiles).

5.2 Flood Hazard Factors (FHFs)

The Flood Hazard Factor is used to correlate flood information with insurance rate tables. Correlations between property damages from floods and their assigned FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between the water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water-surface elevations is greater than 10.0 feet, the accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of the City of Memphis was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations.

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.
Zones A1,A2,A3,A4, A5,A6,A16, and A18:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHFs.
Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; or areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevation for each flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the City of Memphis is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by FEMA.

6.0 OTHER STUDIES

This is the only study that provides up-to-date, comprehensive flood hazard information for all the major streams within the city limits of Memphis. Even though the flood hazard information for the major streams shown in this report varies from other published flood hazard information, it is not conflicting information because the differences are attributed to the changing watershed characteristics.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION (FEET NGVD)[3]
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
Mississippi River							
Reach 1	0025, 0030, 0045, 0050, 0065, 0070	-8.22	-2.10	+6.33	080	A16	Varies
Reach 2	0005, 0010, 0015, 0020, 0025, 0030, 0035, 0045, 0050	-8.79	-2.21	+6.74	090	A18	Varies
Wolf River							
Reach 1	0020, 0035, 0040	-3.21	-0.95	+2.10	030	A6	Varies
Reach 2	0040	-2.70	-0.40	+1.60	025	A5	Varies
Wolf River Lateral A							
Reach 1	0040	-1.03	-0.20	+0.20	010	A2	Varies

[1]Flood Insurance Rate Map Panel [2]Weighted Average [3]Rounded to Nearest Foot

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN

(SHELBY CO.)

FLOOD INSURANCE ZONE DATA

MISSISSIPPI RIVER-WOLF RIVER-WOLF RIVER LATERAL A

BEST DOCUMENT AVAILABLE

BEST DOCUMENT AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION (FEET NGVD)[3]
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
Wolf River Lateral AA Reach 1	0040, 0060	-2.34	-0.25	+0.20	025	A5	Varies
Wolf River Lateral M Reach 1	0015, 0020	-1.61	-1.15	+0.79	015	A3	Varies
Fletcher Creek Reach 1	0020, 0040	-1.34	-0.51	+1.21	015	A3	Varies
Fletcher Creek Lateral B Reach 1	0040	-0.99	-0.42	+0.56	010	A2	Varies
Harrington Creek Reach 1	0020	-1.41	-0.28	+0.50	015	A3	Varies
Reach 2	0020	-0.54	-0.21	+0.49	005	A1	Varies
Harrington Creek Lateral B Reach 1	0020	-1.07	-0.27	+0.65	010	A2	Varies

[1]Flood Insurance Rate Map Panel [2]Weighted Average [3]Rounded to Nearest Foot

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN

(SHELBY CO.)

FLOOD INSURANCE ZONE DATA

WOLF RIVER LATERAL AA-WOLF RIVER LATERAL M-FLETCHER CREEK-FLETCHER CREEK LATERAL B-HARRINGTON CREEK-HARRINGTON CREEK LATERAL B

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION (FEET NGVD)[3]
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
Cypress Creek							
Reach 1	0050, 0075	-1.41	-0.50	+1.01	015	A3	Varies
Reach 2	0075	-2.95	-1.10	+2.12	030	A6	Varies
Nonconnah Creek							
Reach 1	0050, 0055, 0060	-2.46	-0.96	+1.96	025	A5	Varies
Reach 2	0060	-2.00	-0.80	+1.80	020	A4	Varies
Days Creek							
Reach 1	0055, 0075	-3.24	-0.99	+2.11	030	A6	Varies
Hurricane Creek							
Reach 1	0055	-1.80	-0.72	+0.62	020	A4	Varies
Reach 2	0055, 0080	-1.60	-0.50	+0.60	015	A3	Varies
Tenmile Creek							
Reach 1	0055	-1.83	-0.53	+0.73	020	A4	Varies
Reach 2	0055, 0080	-2.79	-1.45	+1.81	030	A6	Varies
Reach 3	0080	-1.50	-0.52	+1.01	015	A3	Varies

[1]Flood Insurance Rate Map Panel [2]Weighted Average [3]Rounded to Nearest Foot

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN

(SHELBY CO.)

FLOOD INSURANCE ZONE DATA

CYPRESS CREEK-NONCONNAH CREEK-DAYS CREEK-HURRICANE CREEK-TENMILE CREEK

BEST DOCUMENT AVAILABLE

BEST DOCUMENT AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION (FEET NGVD)[3]
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
Tenmile Creek Lateral A							
Reach 1	0055	-1.19	-0.46	+0.68	010	A2	Varies
Reach 2	0055	-2.40	-1.31	+0.62	025	A5	Varies
Reach 3	0055	-0.90	-0.50	+0.30	010	A2	Varies
John's Creek							
Reach 1	0060, 0080	-1.45	-0.75	+0.99	015	A3	Varies
Howard Road Outfall							
Reach 1	0060	-1.08	-0.33	+0.75	010	A2	Varies
Reach 2	0060	-0.51	-0.24	+0.32	005	A1	Varies
Loosahatchie River							
Reach 1	0005	-3.21	-1.11	+2.10	030	A6	Varies

[1]Flood Insurance Rate Map Panel [2]Weighted Average [3]Rounded to Nearest Foot

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN

(SHELBY CO.)

FLOOD INSURANCE ZONE DATA

TENMILE CREEK LATERAL A-JOHN'S CREEK-HOWARD ROAD OUTFALL-LOOSAHATCHIE RIVER

7.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, 1375 Peachtree Street, N.E., Atlanta, Georgia 30309.

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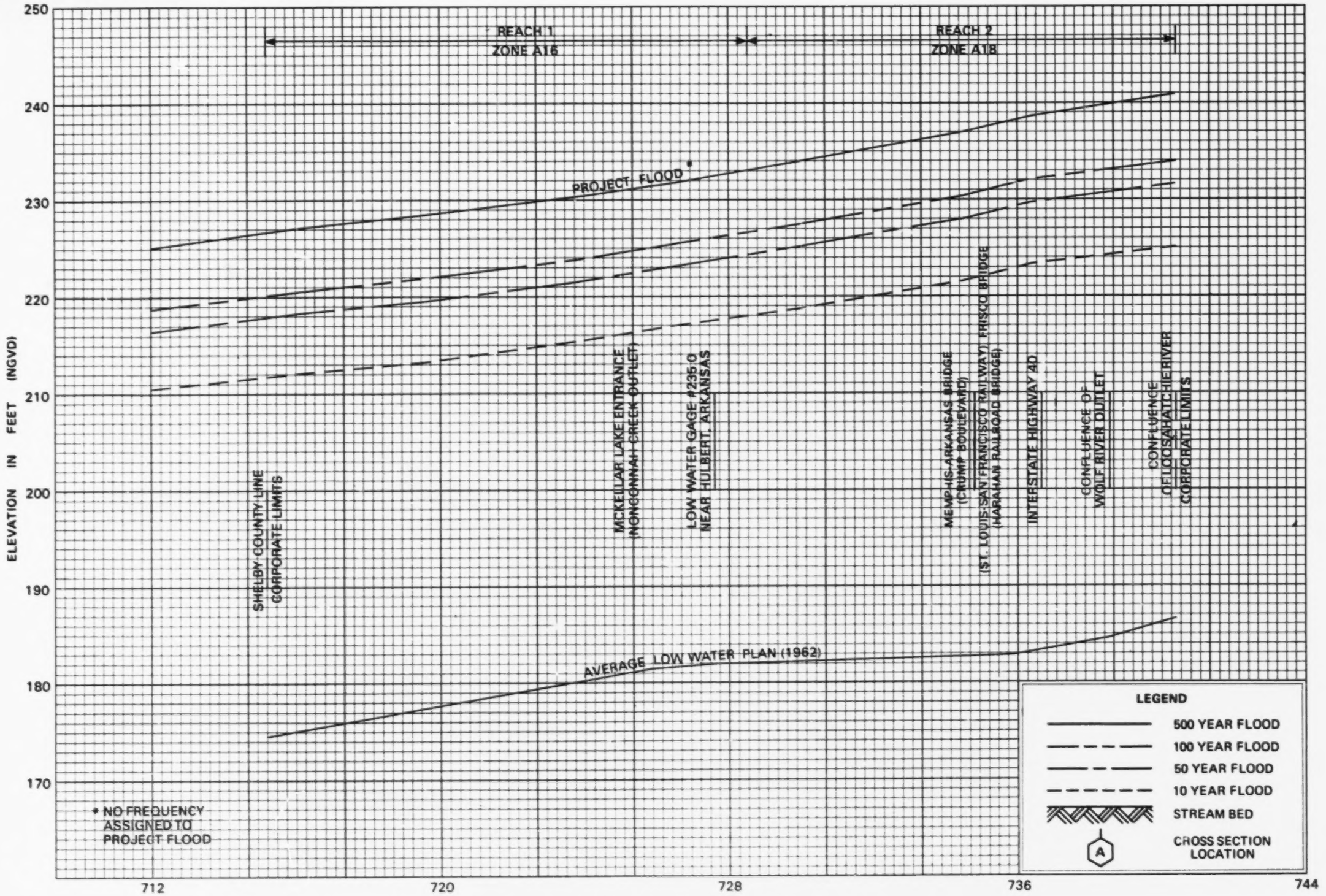

FLOOD PROFILES

MISSISSIPPI RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

01P

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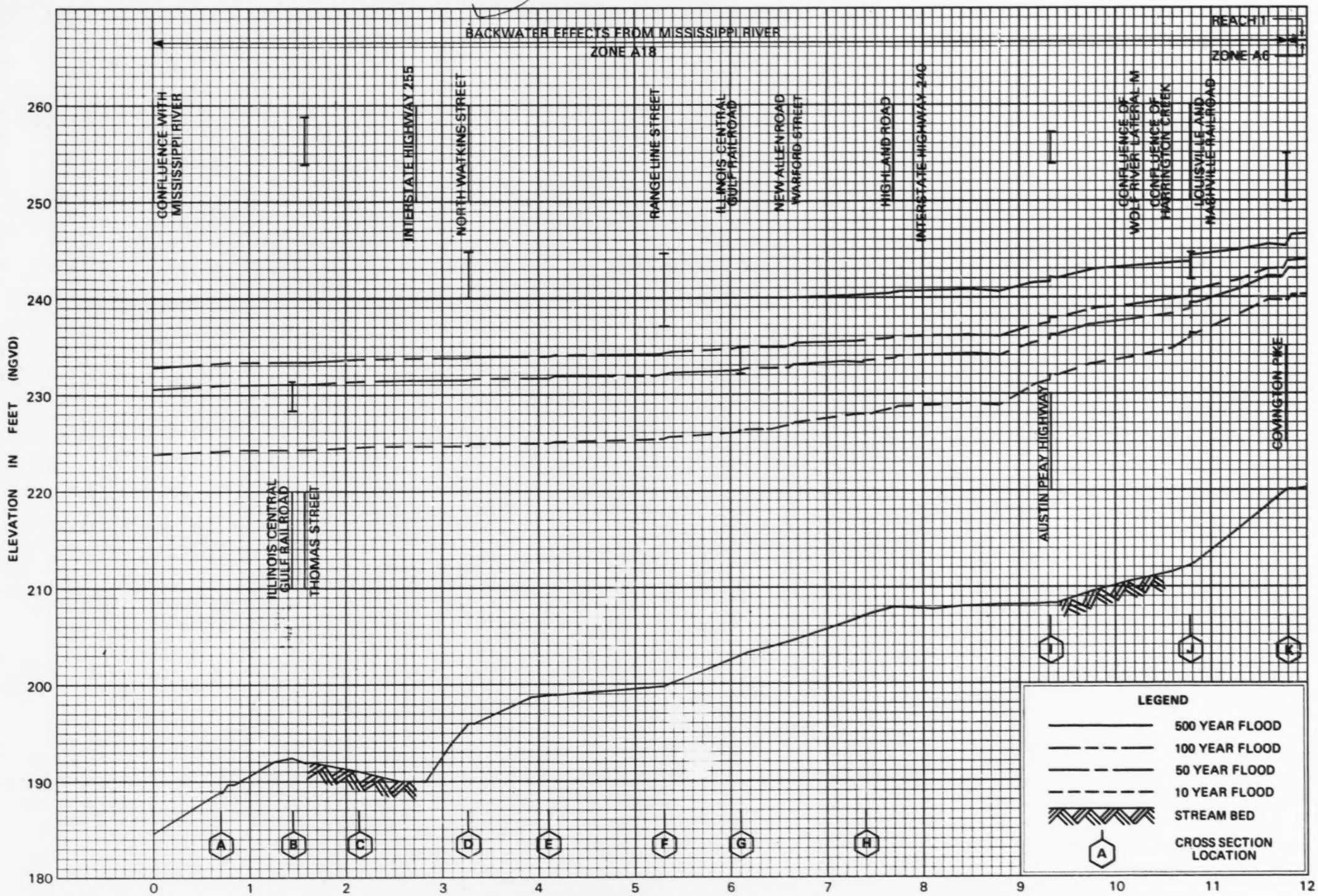

FLOOD PROFILES

WOLF RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

02P

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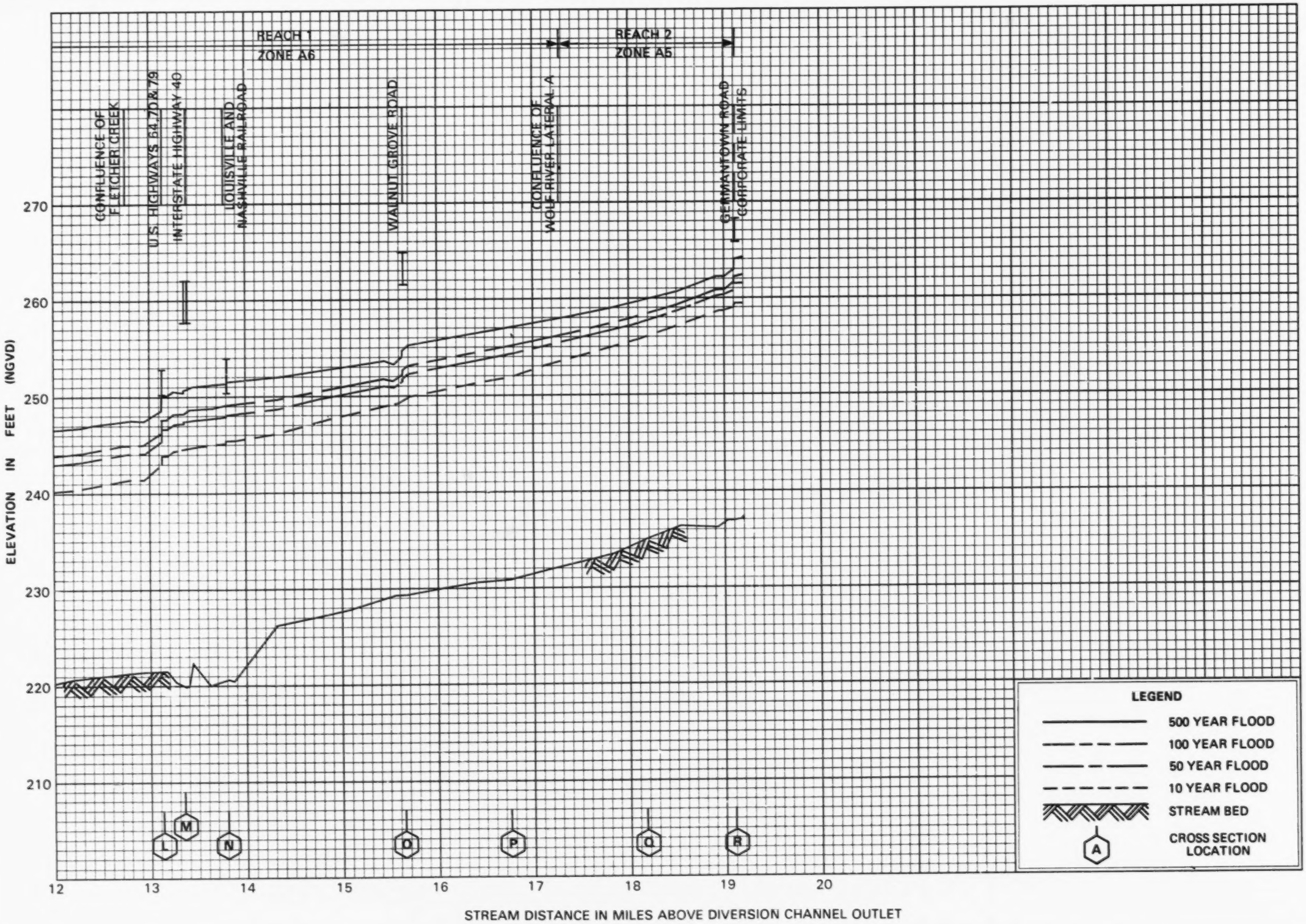

FLOOD PROFILES

WOLF RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

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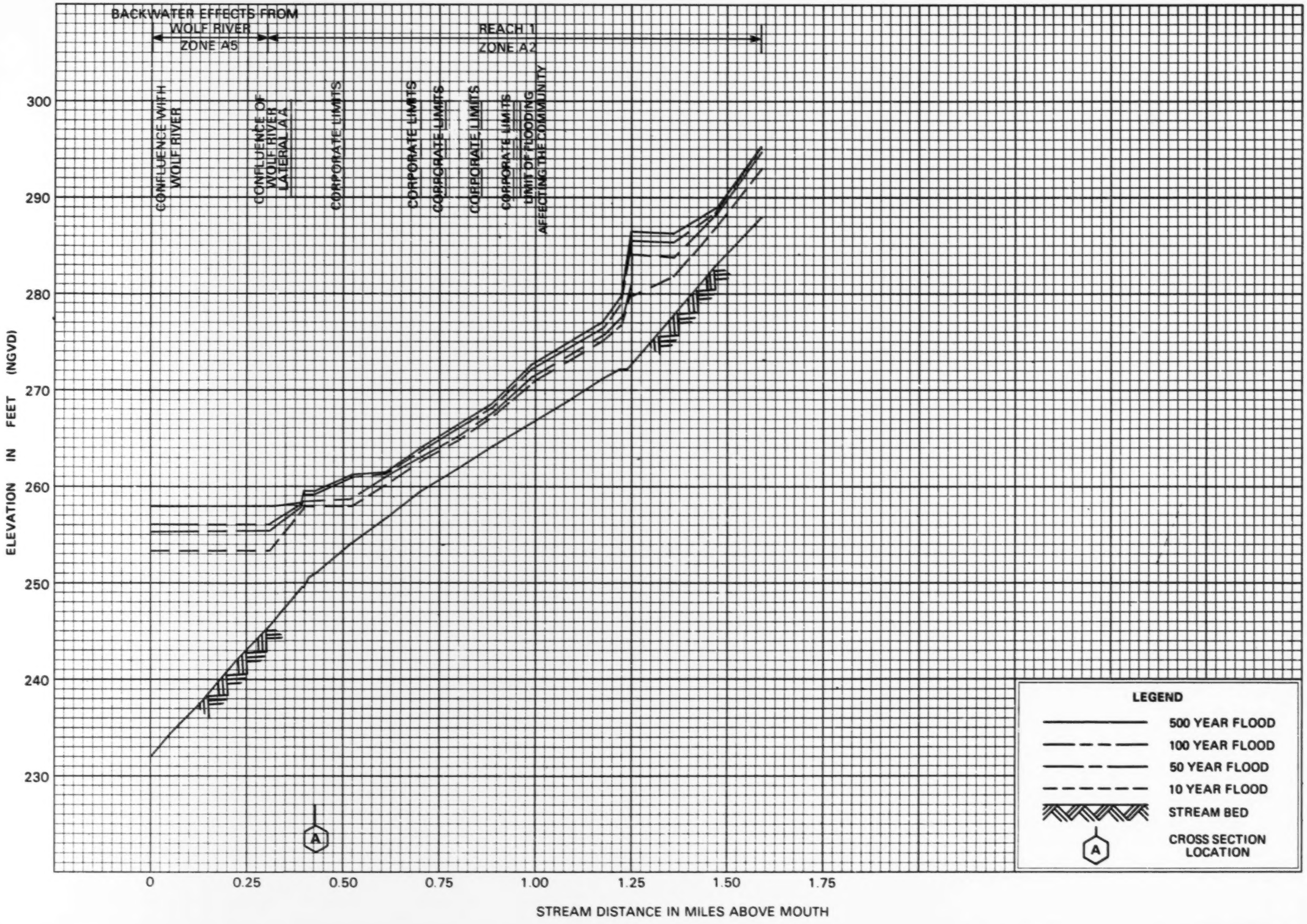

FLOOD PROFILES

WOLF RIVER LATERAL A

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

04P

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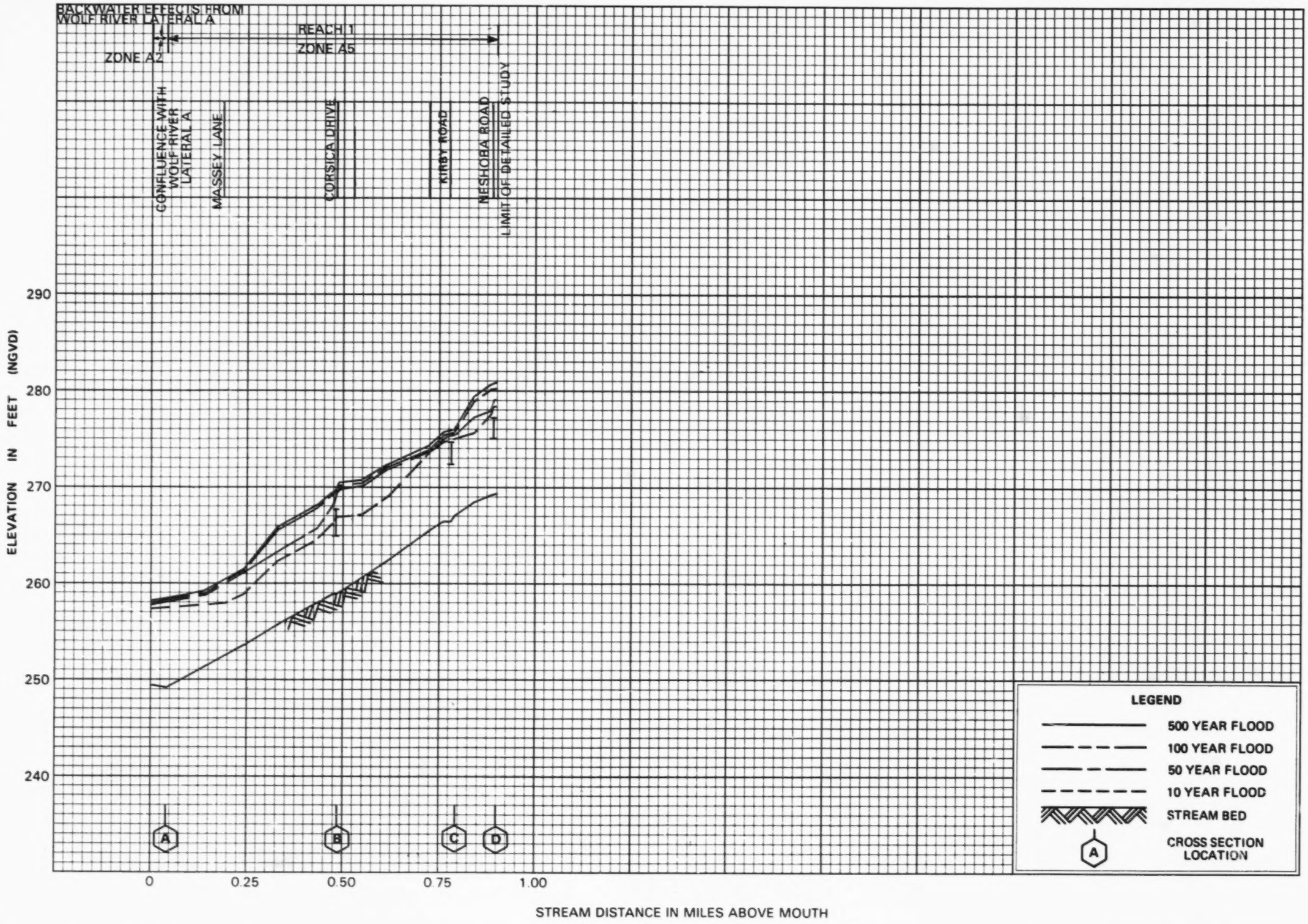

FLOOD PROFILES

WOLF RIVER LATERAL AA

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

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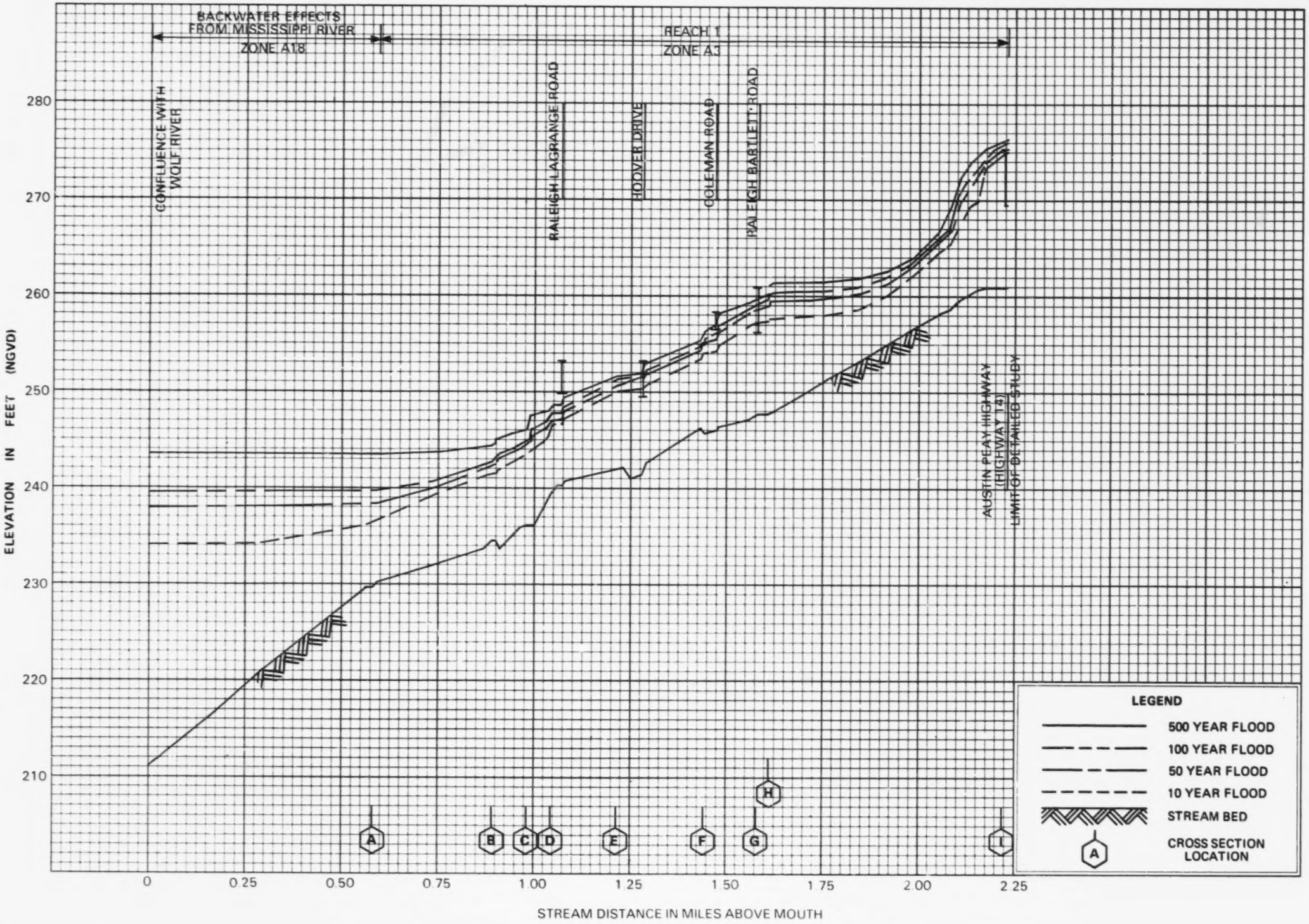

FLOOD PROFILES

WOLF RIVER LATERAL M

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

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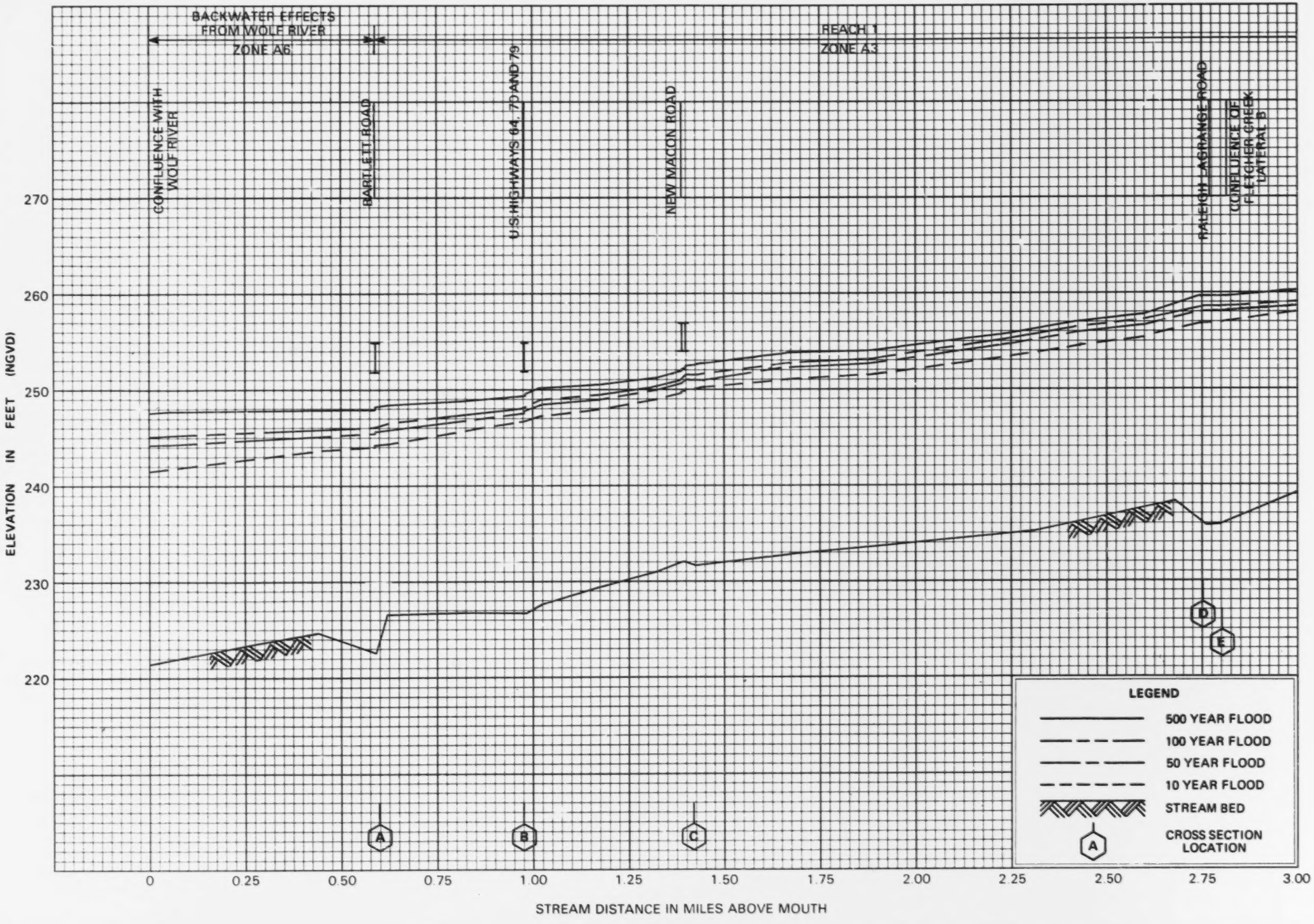

FLOOD PROFILES

FLETCHER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

07P

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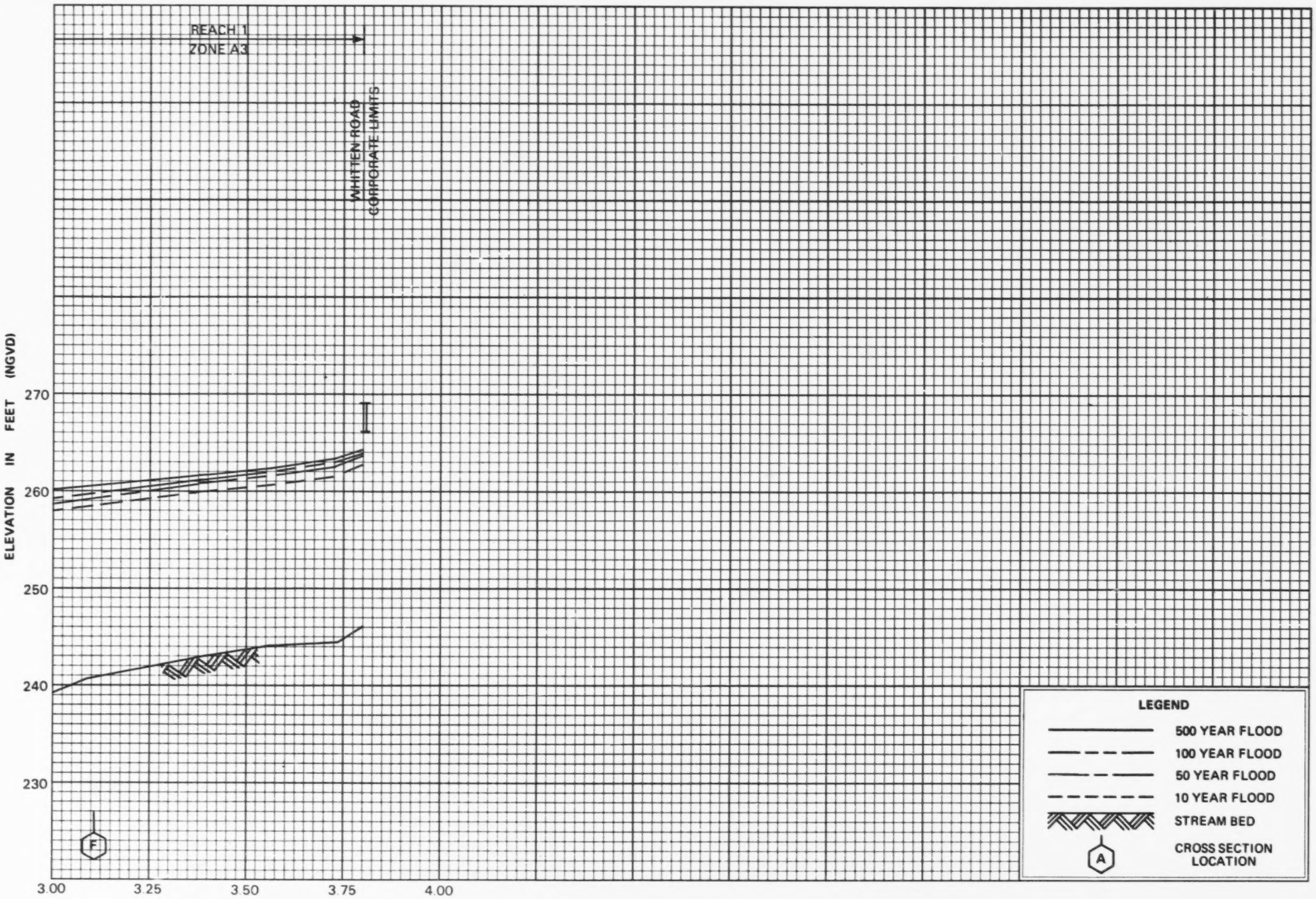

FLOOD PROFILES

FLETCHER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

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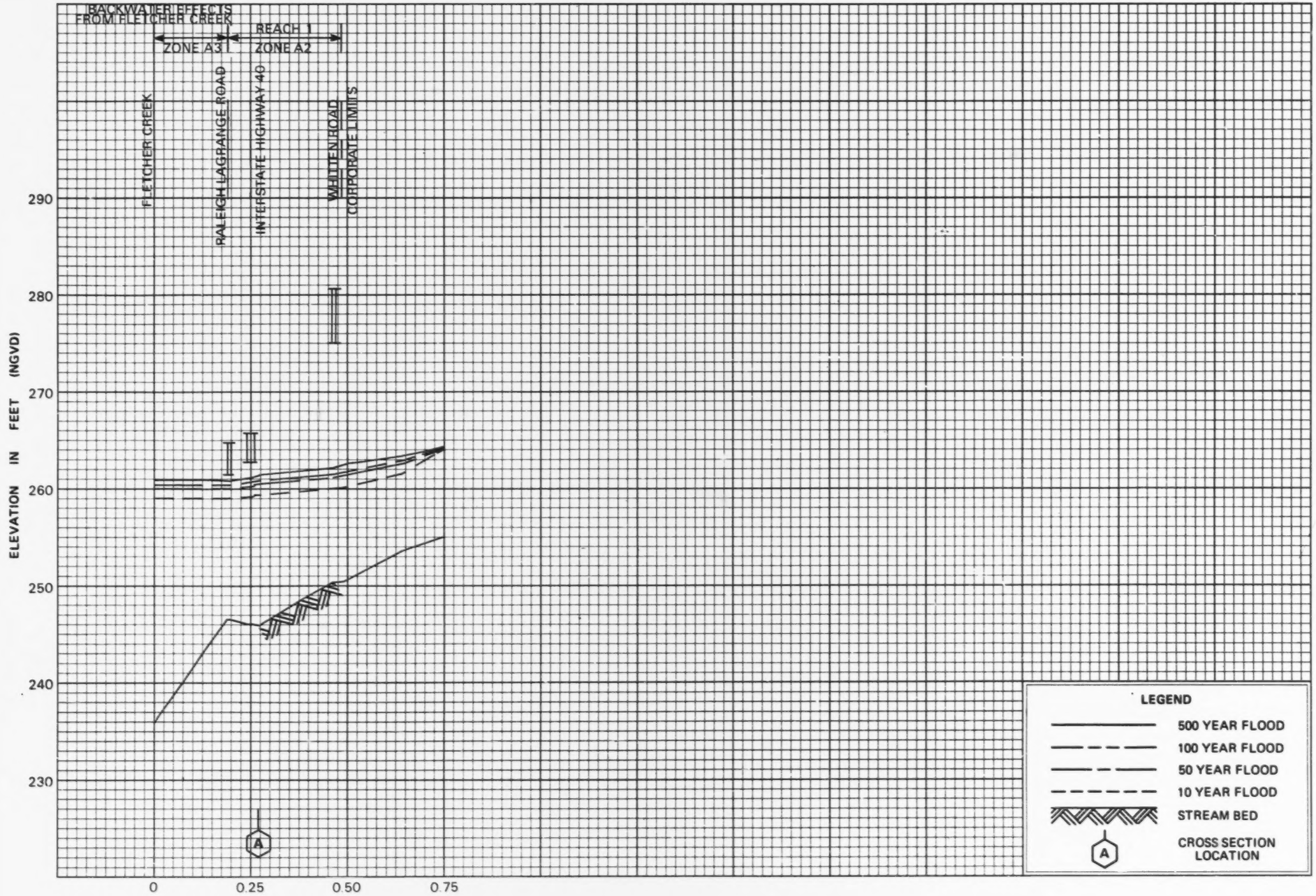

FLOOD PROFILES

FLETCHER CREEK LATERAL B

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

09P

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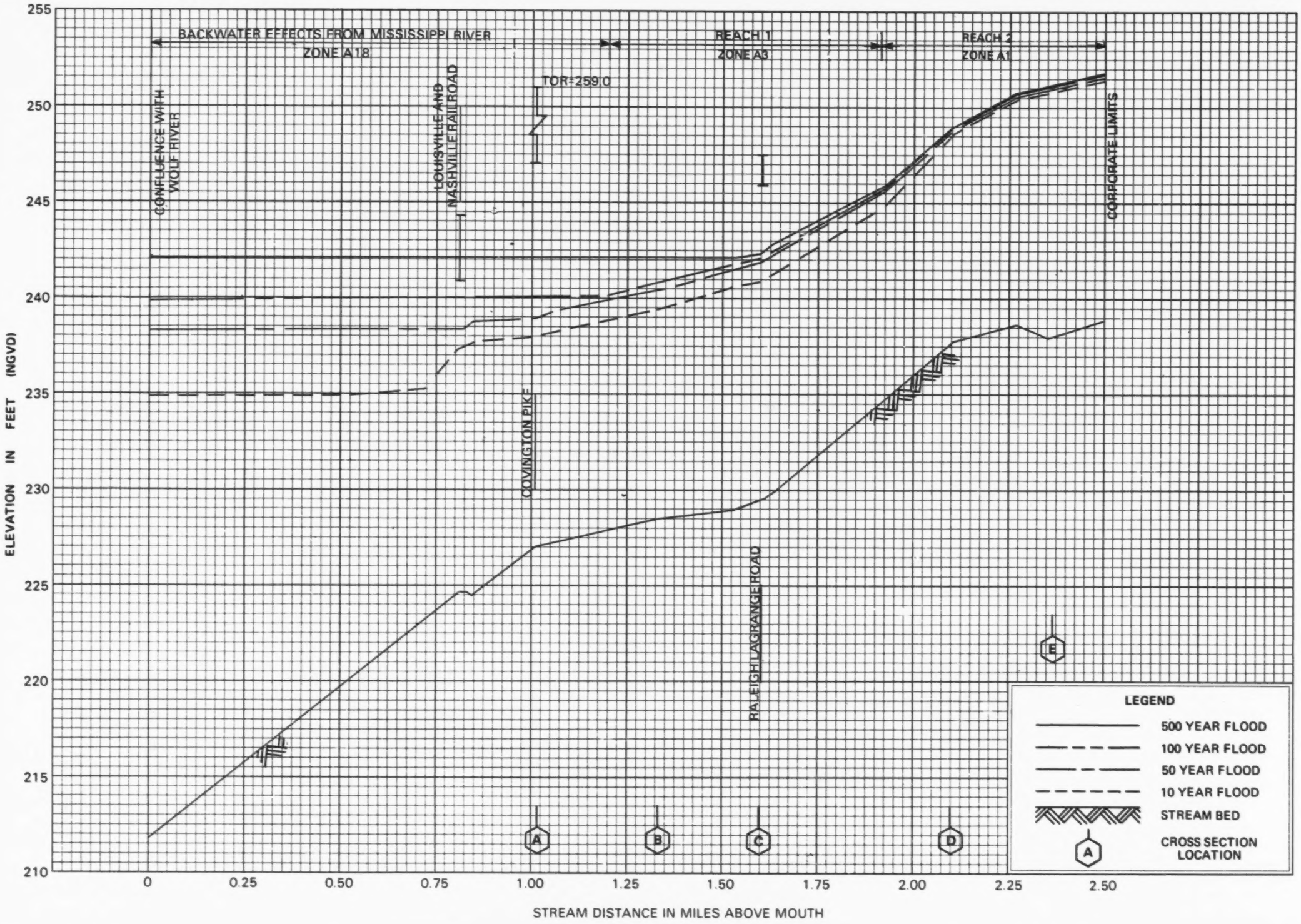

FLOOD PROFILES

HARRINGTON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

10P

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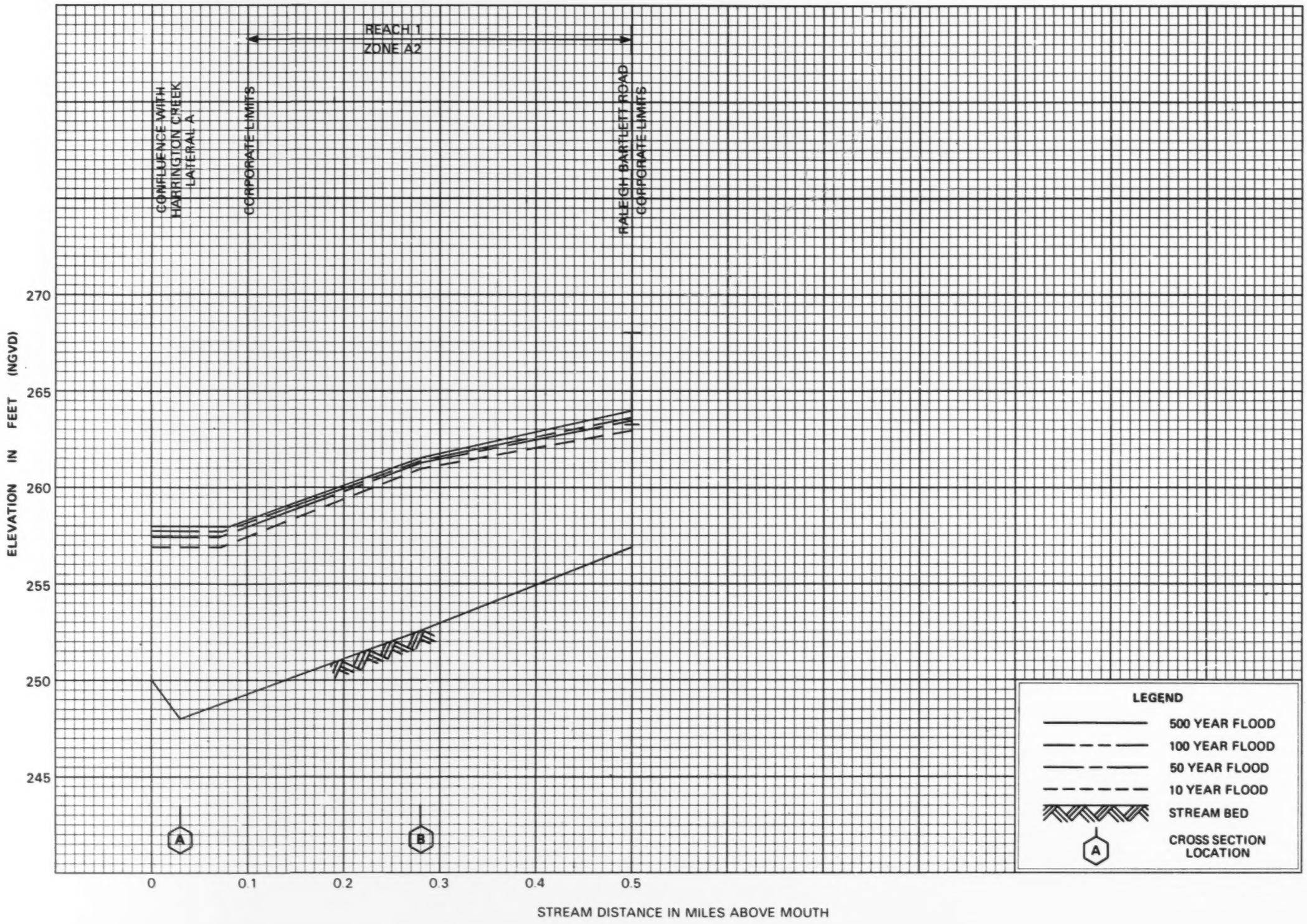

FLOOD PROFILES

HARRINGTON CREEK LATERAL B

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

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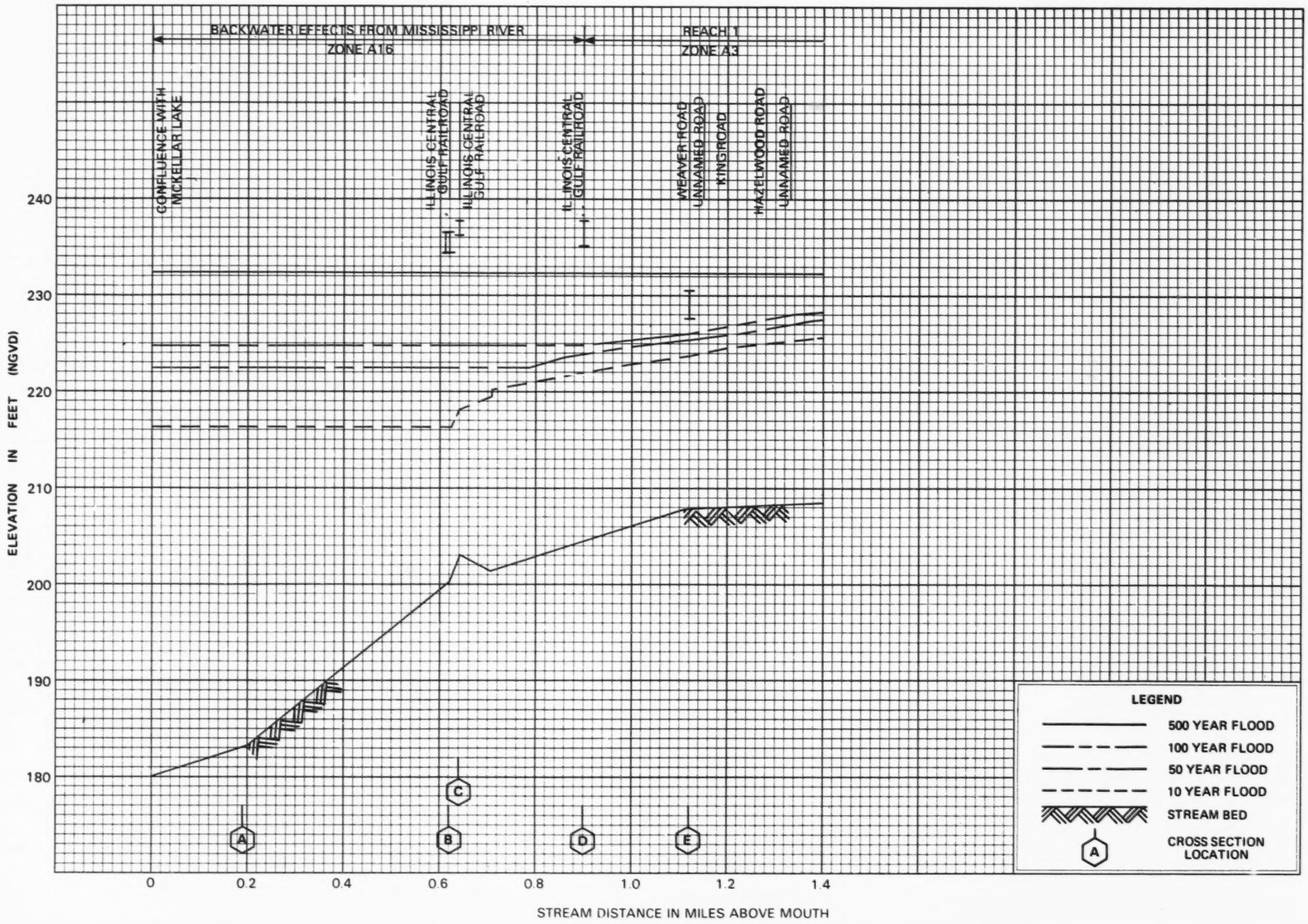

FLOOD PROFILES

CYPRESS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

12P

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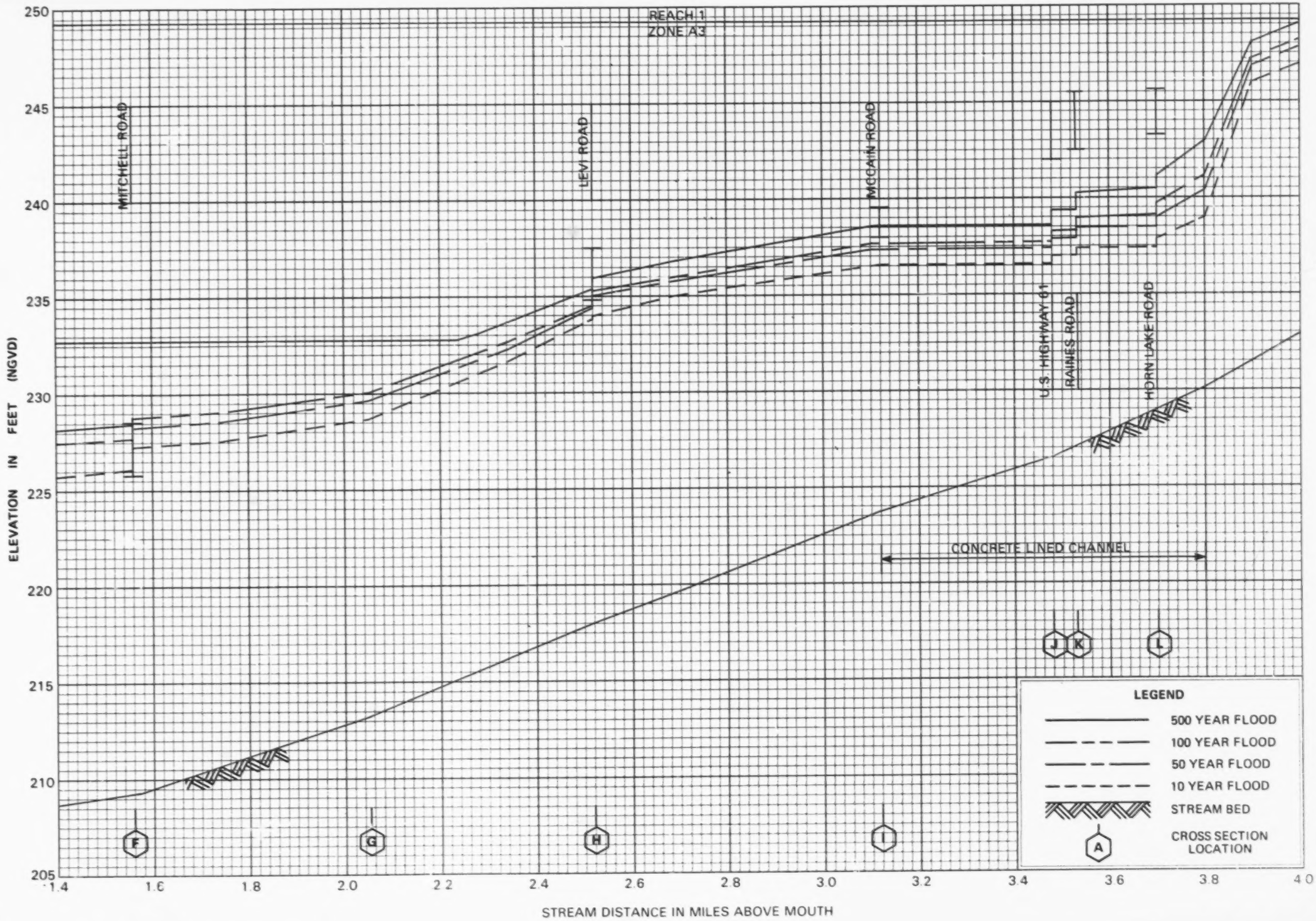

FLOOD PROFILES

CYPRESS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

13P

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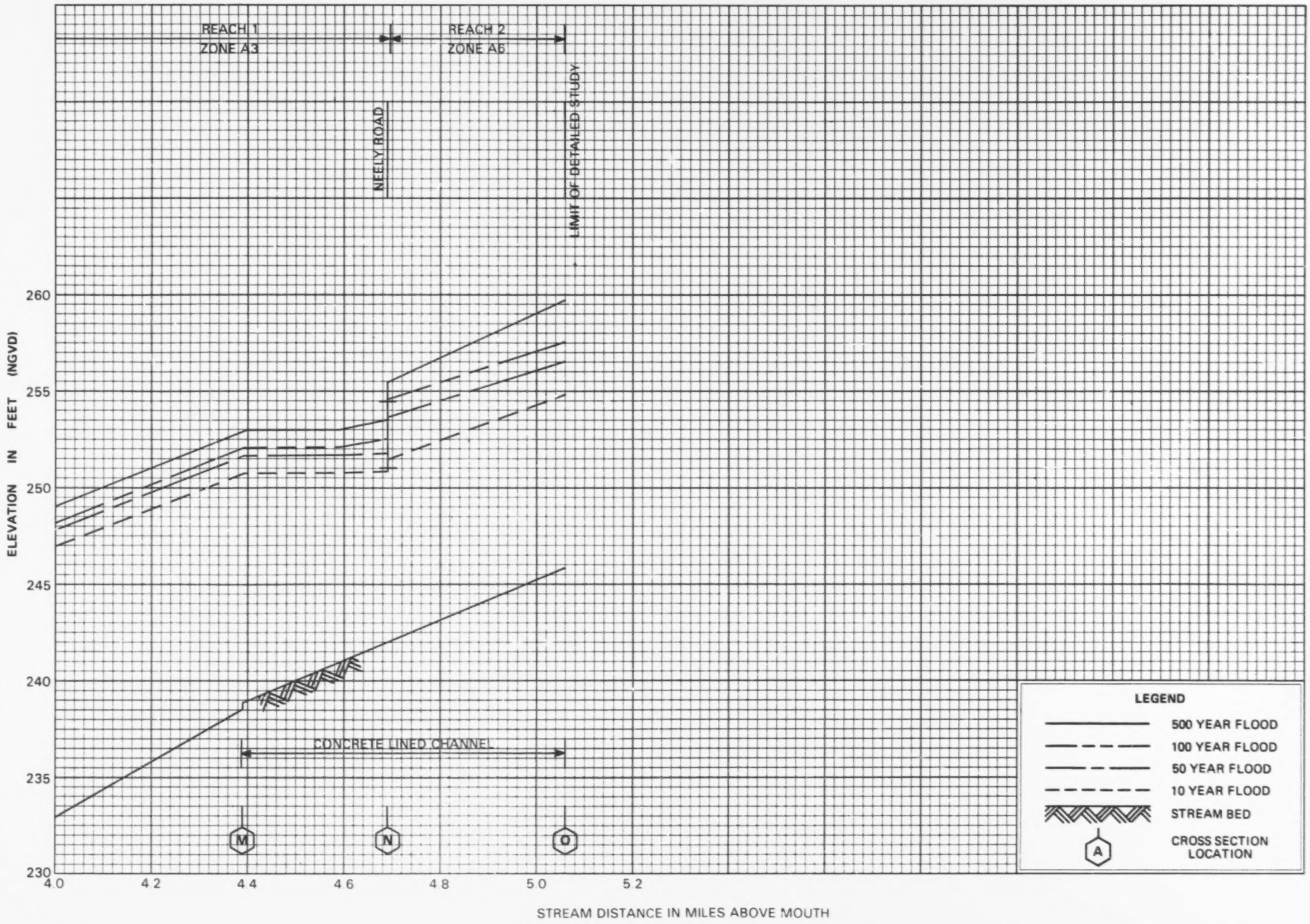

FLOOD PROFILES

CYPRESS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

14P

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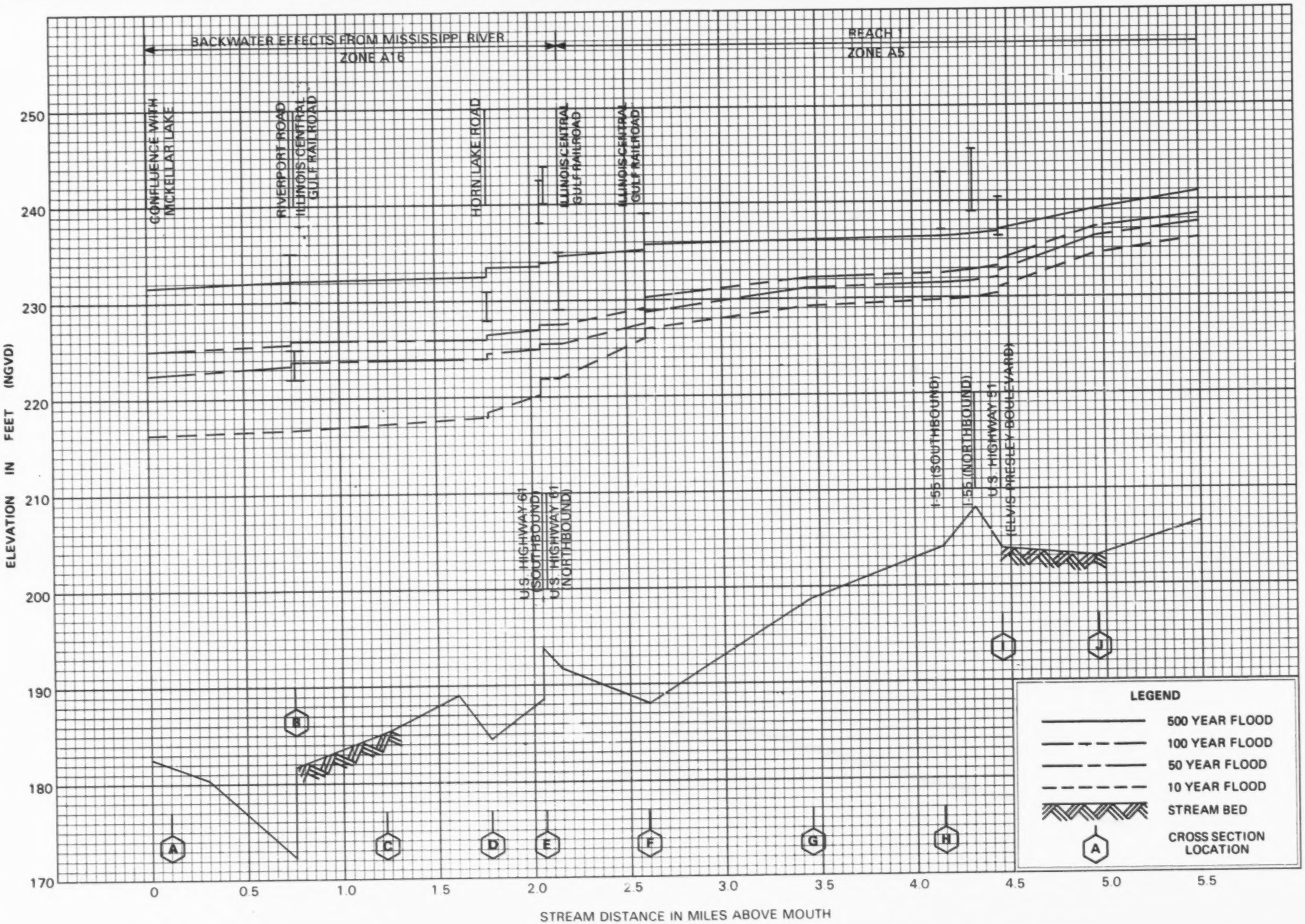

FLOOD PROFILES

NONCONNAH CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

15P

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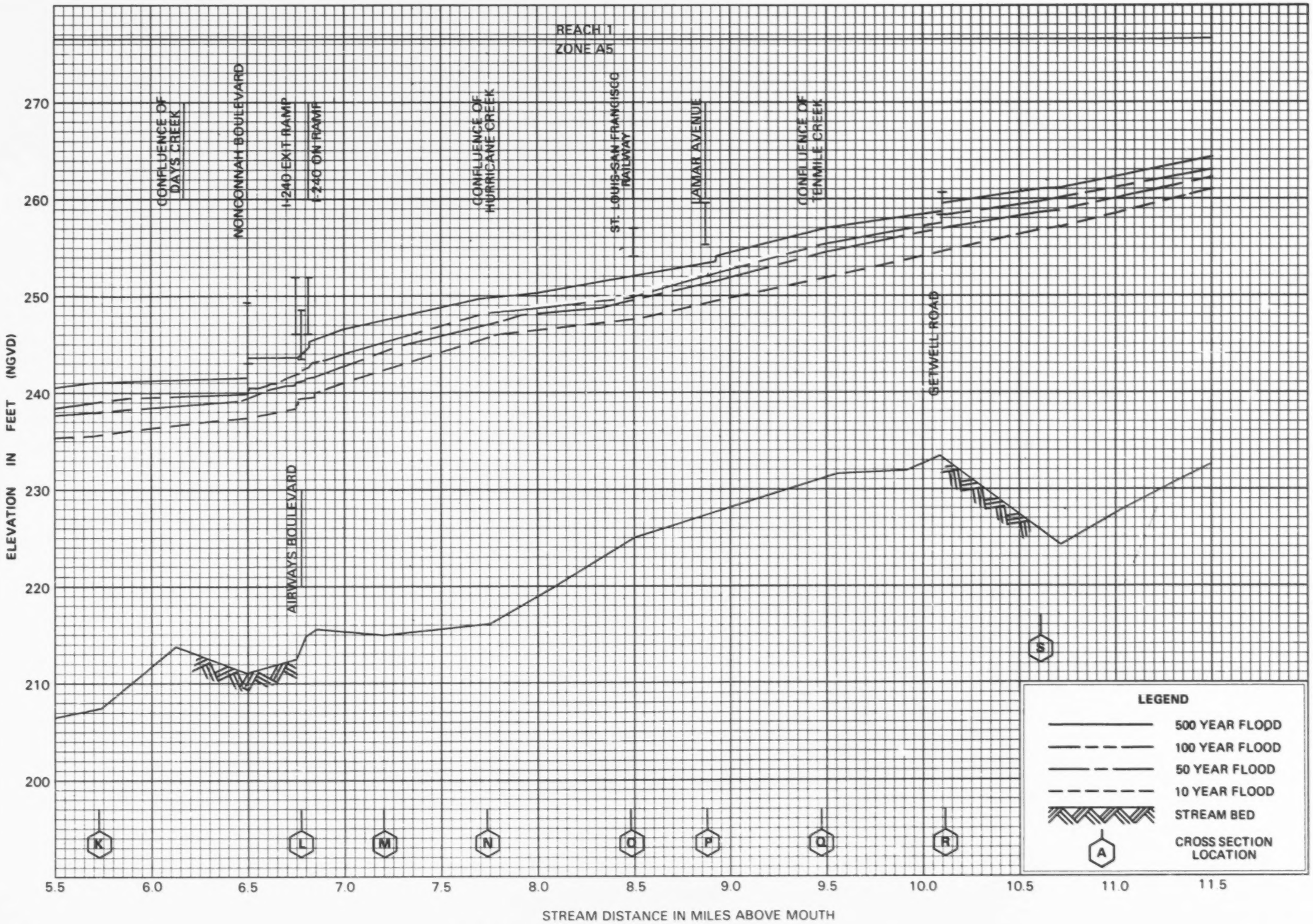

FLOOD PROFILES

NONCONNAH CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

16P

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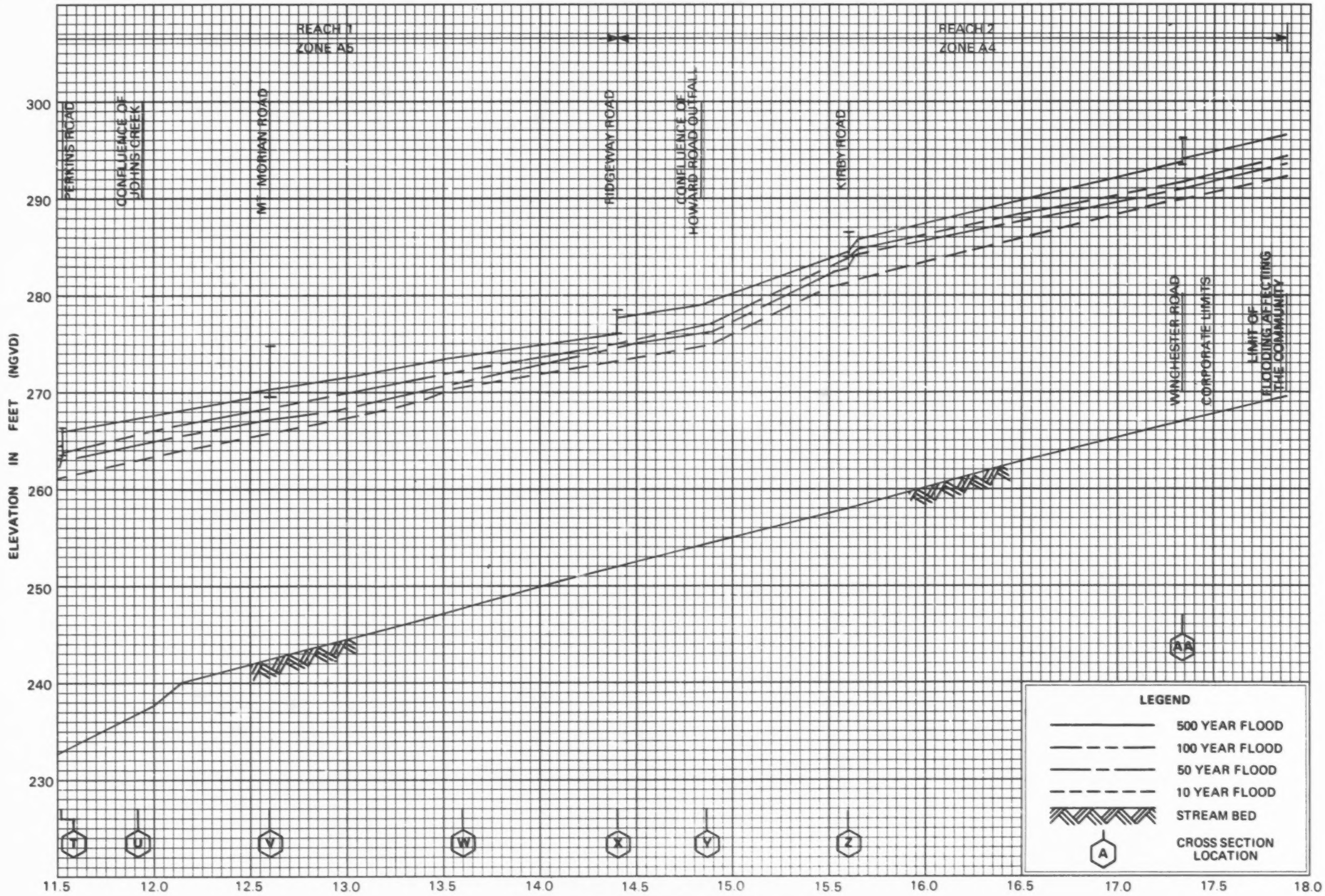

FLOOD PROFILES

NONCONNAH CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN

(SHELBY CO.)

17P

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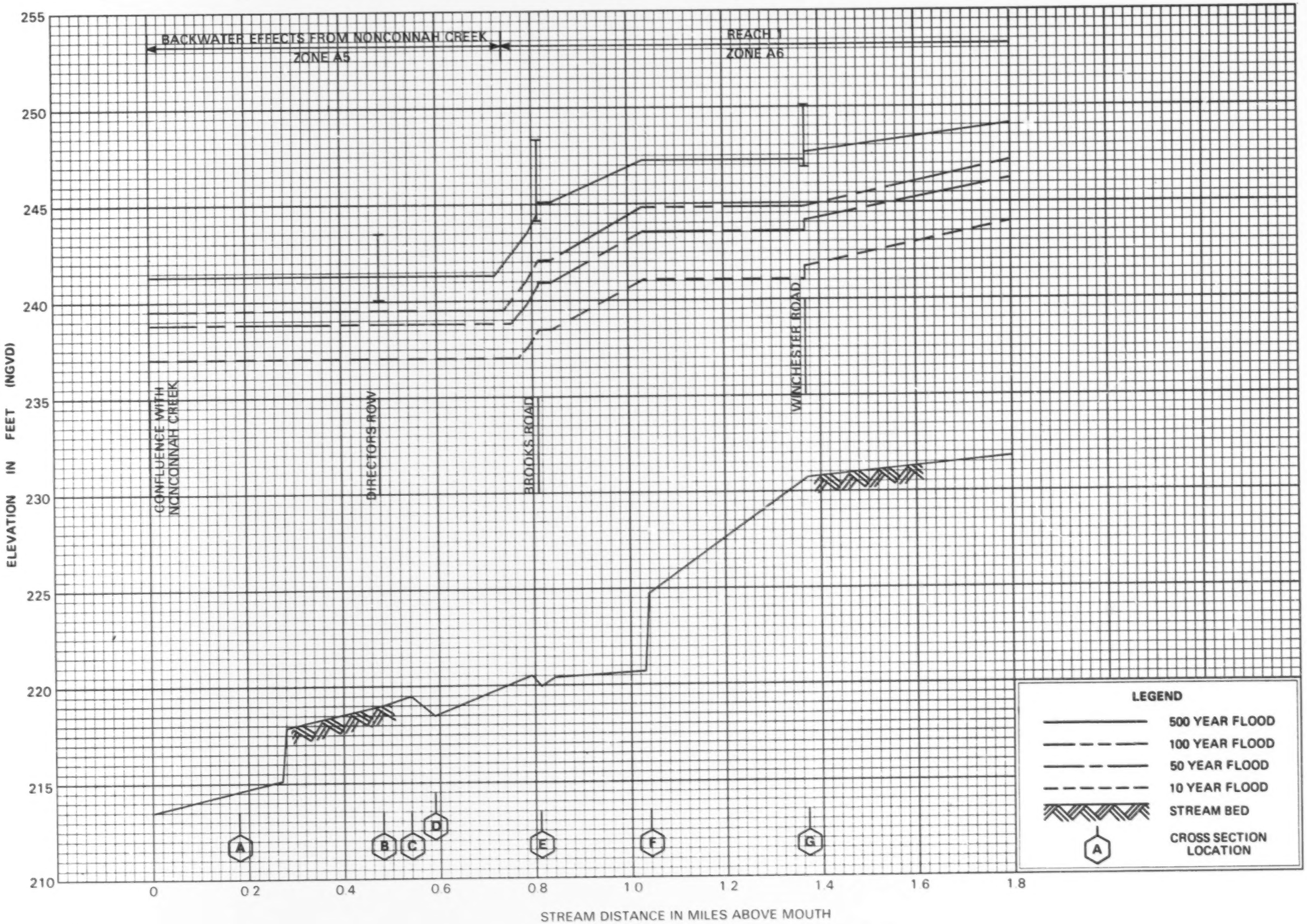

FLOOD PROFILES

DAYS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

18P

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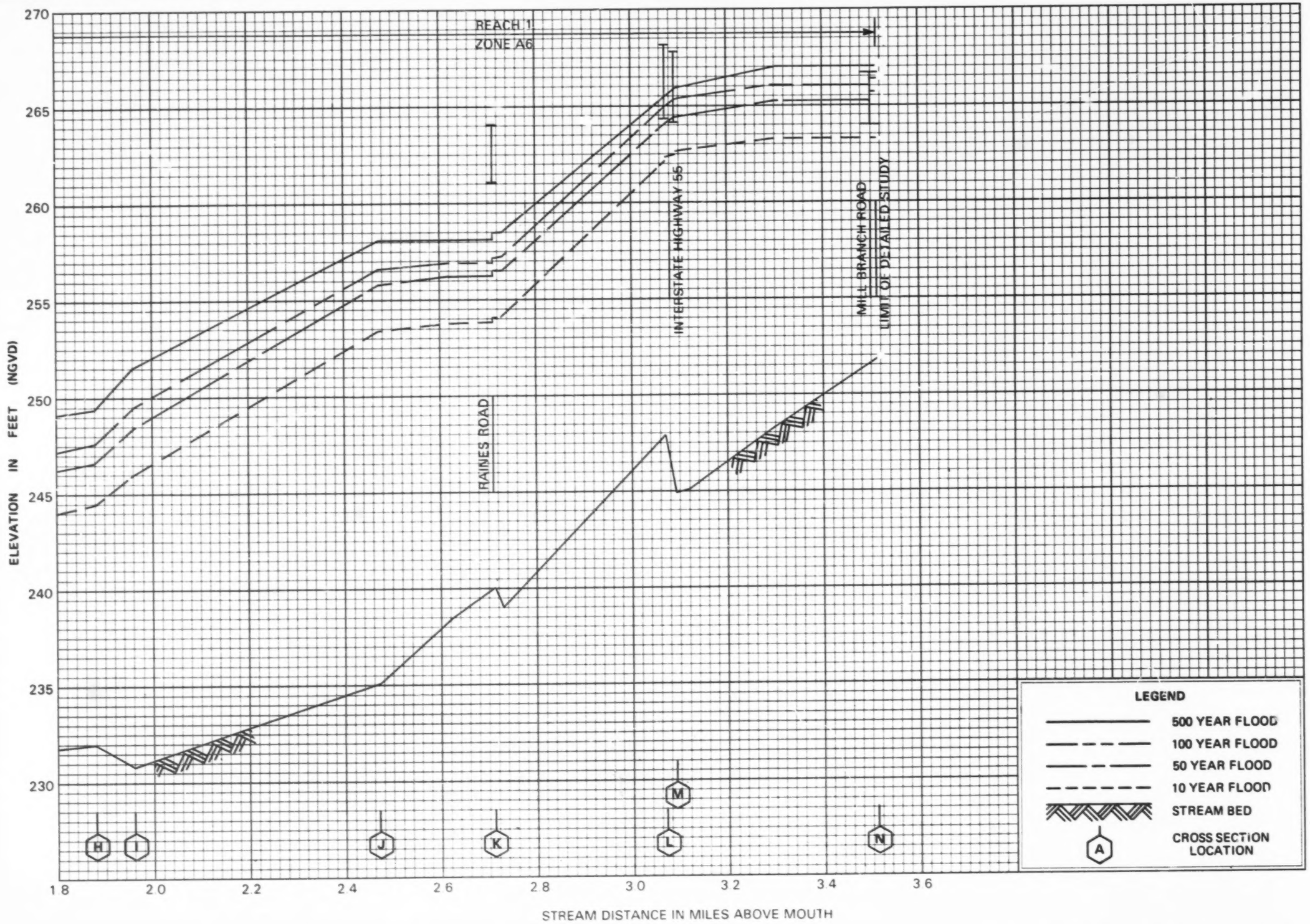

FLOOD PROFILES

DAYS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

19P

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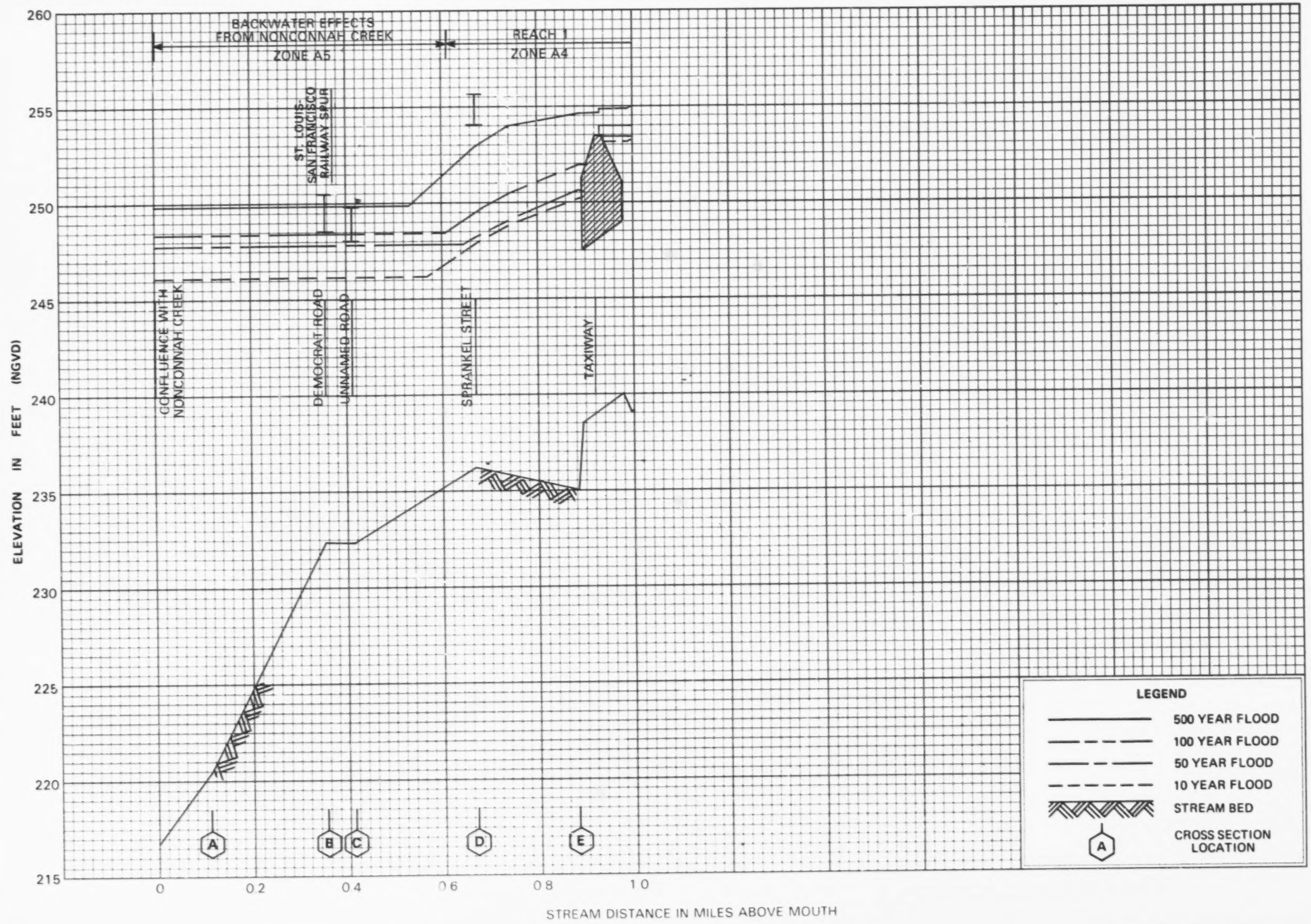

FLOOD PROFILES

HURRICANE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

20P

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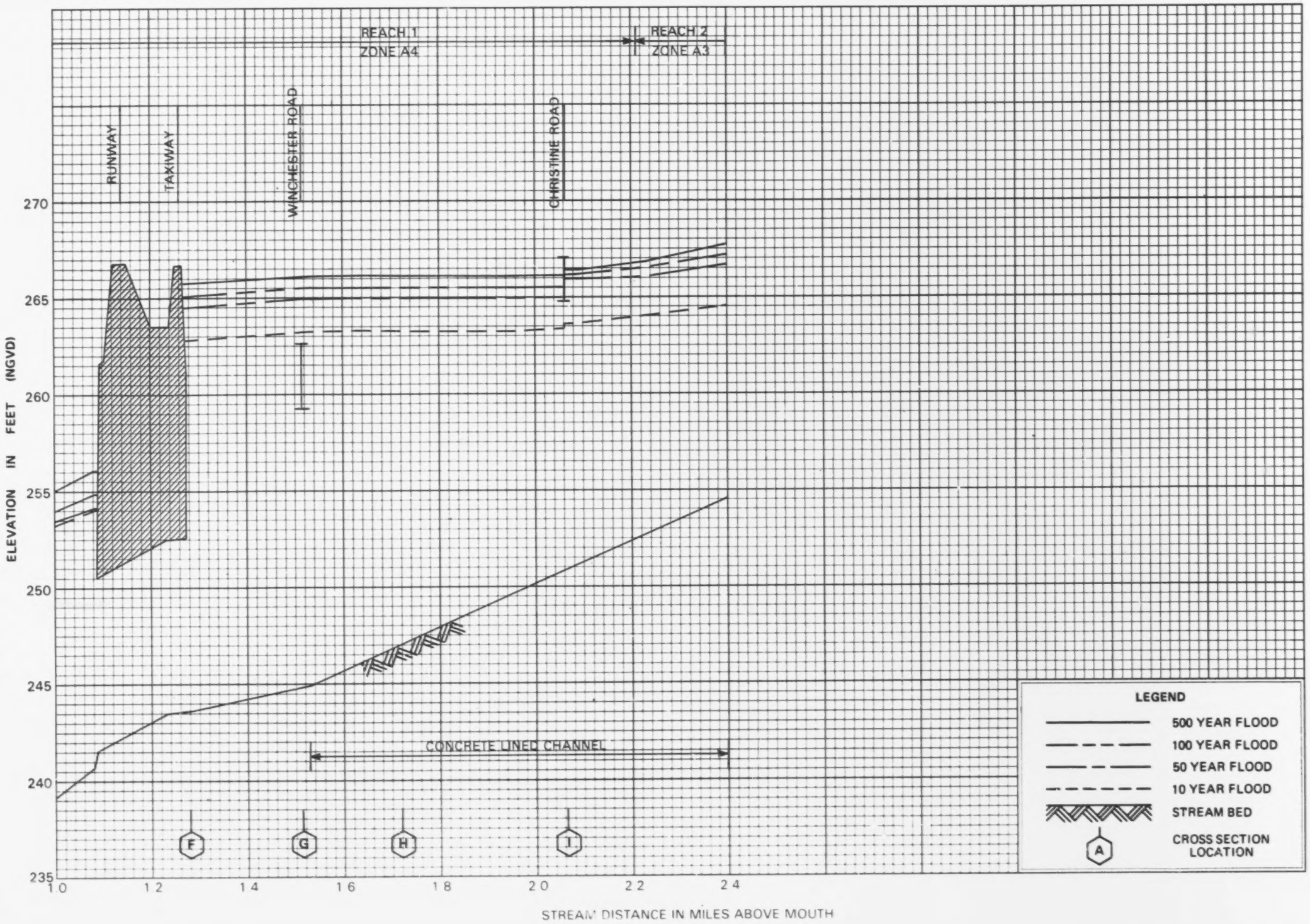

FLOOD PROFILES

HURRICANE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

21P

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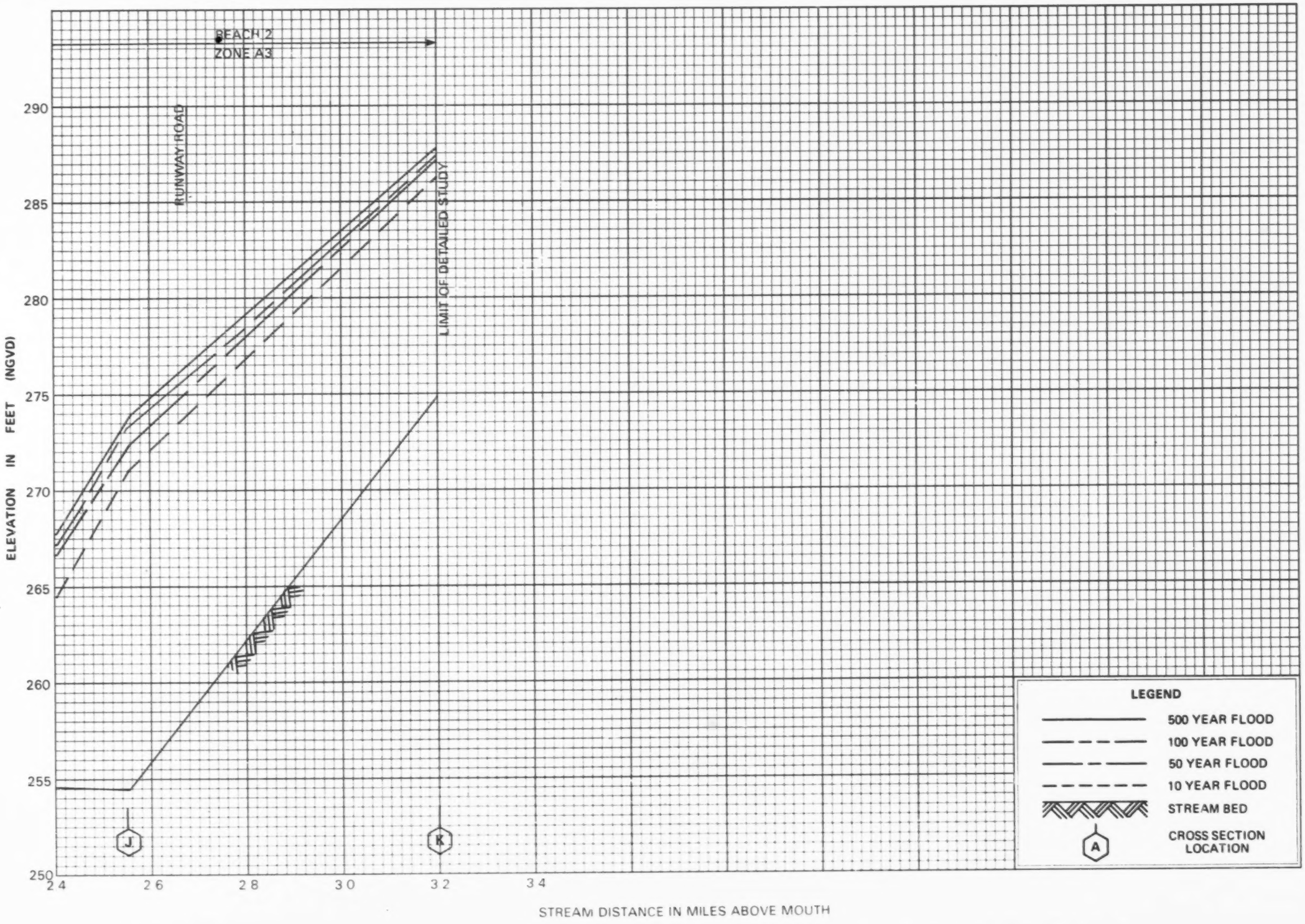

FLOOD PROFILES

HURRICANE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

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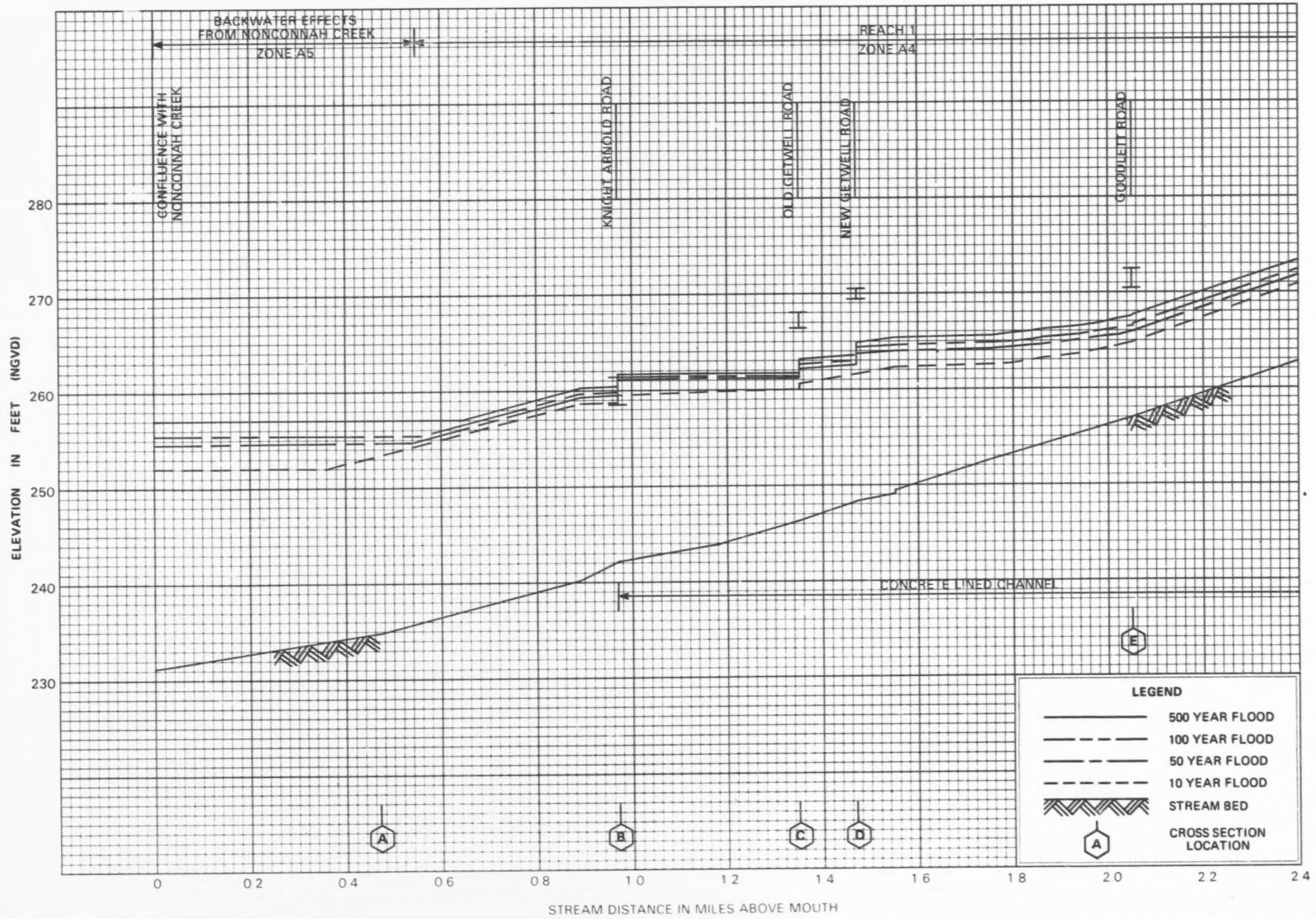

FLOOD PROFILES

TENMILE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

23P

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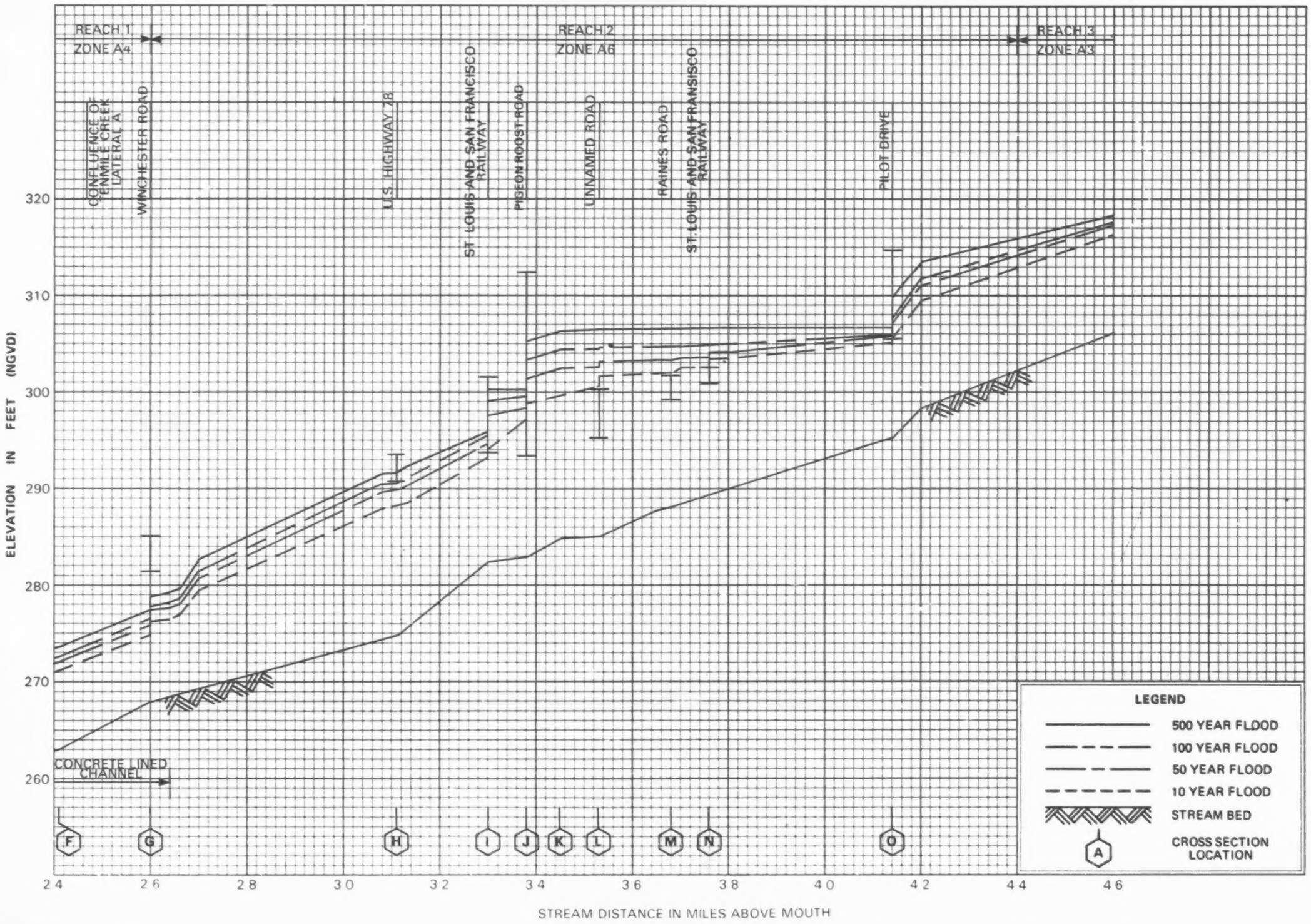

FLOOD PROFILES

TENMILE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

24P

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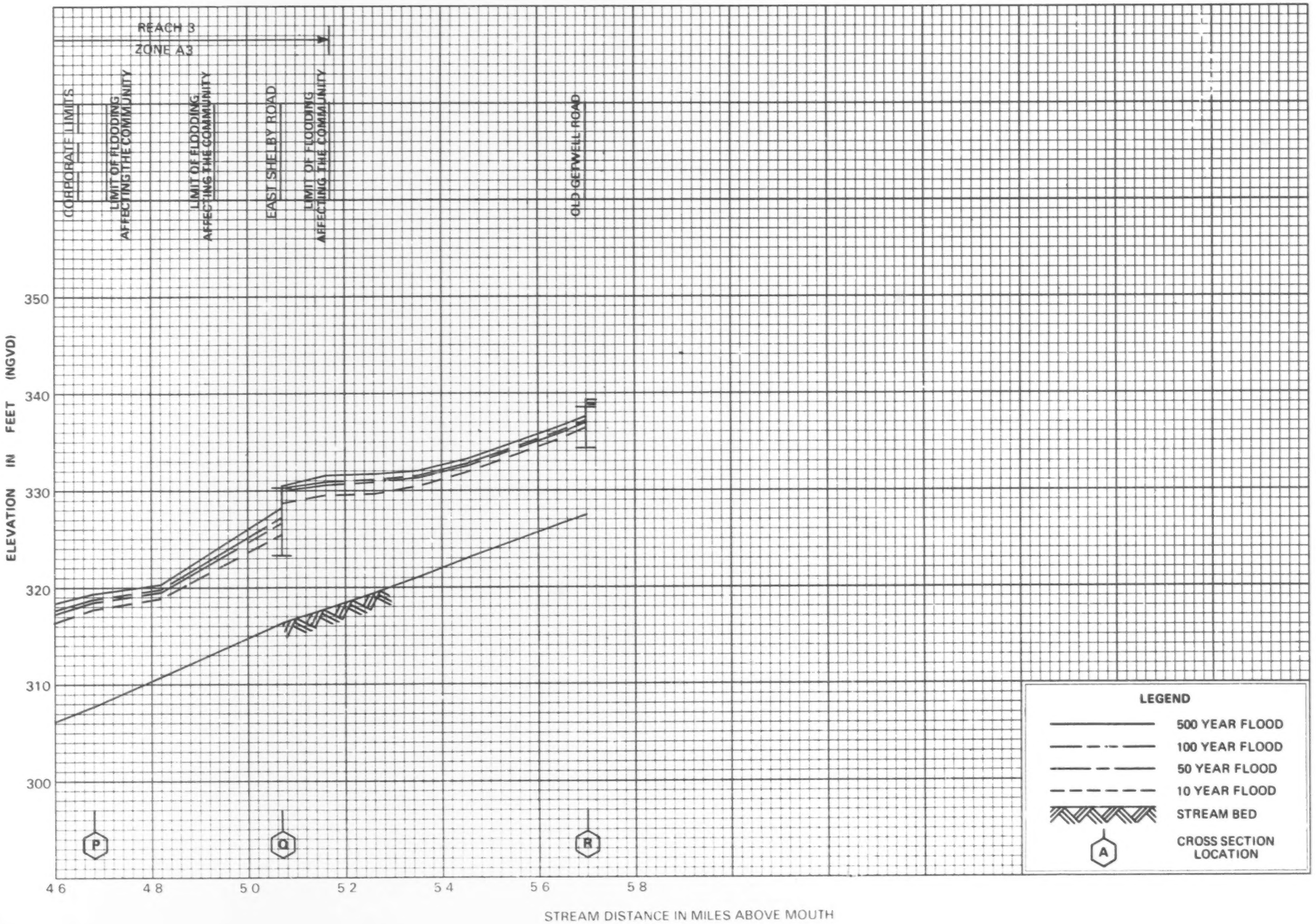

FLOOD PROFILES

TENMILE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

25P

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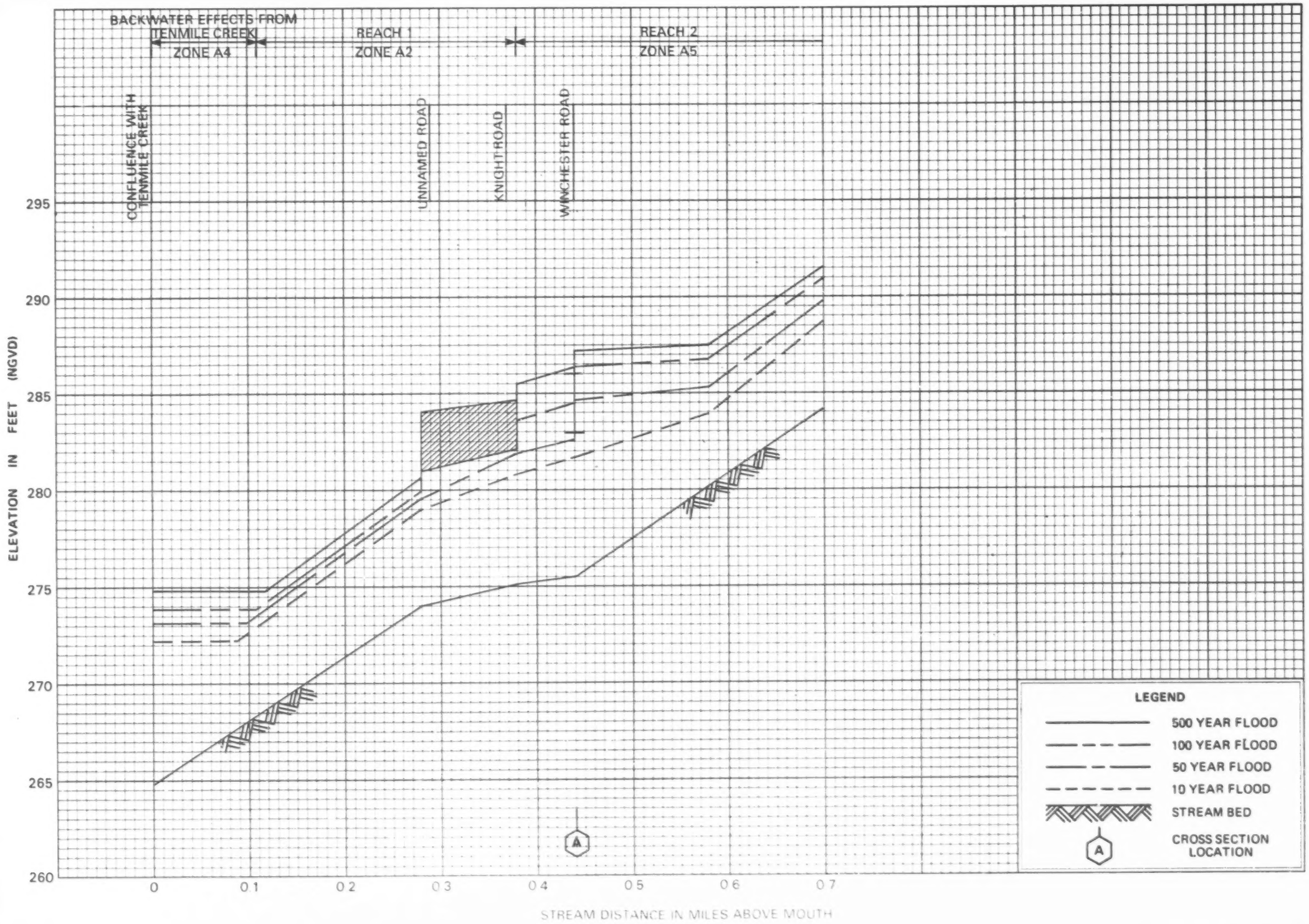

FLOOD PROFILES

TENMILE CREEK LATERAL A

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

26P

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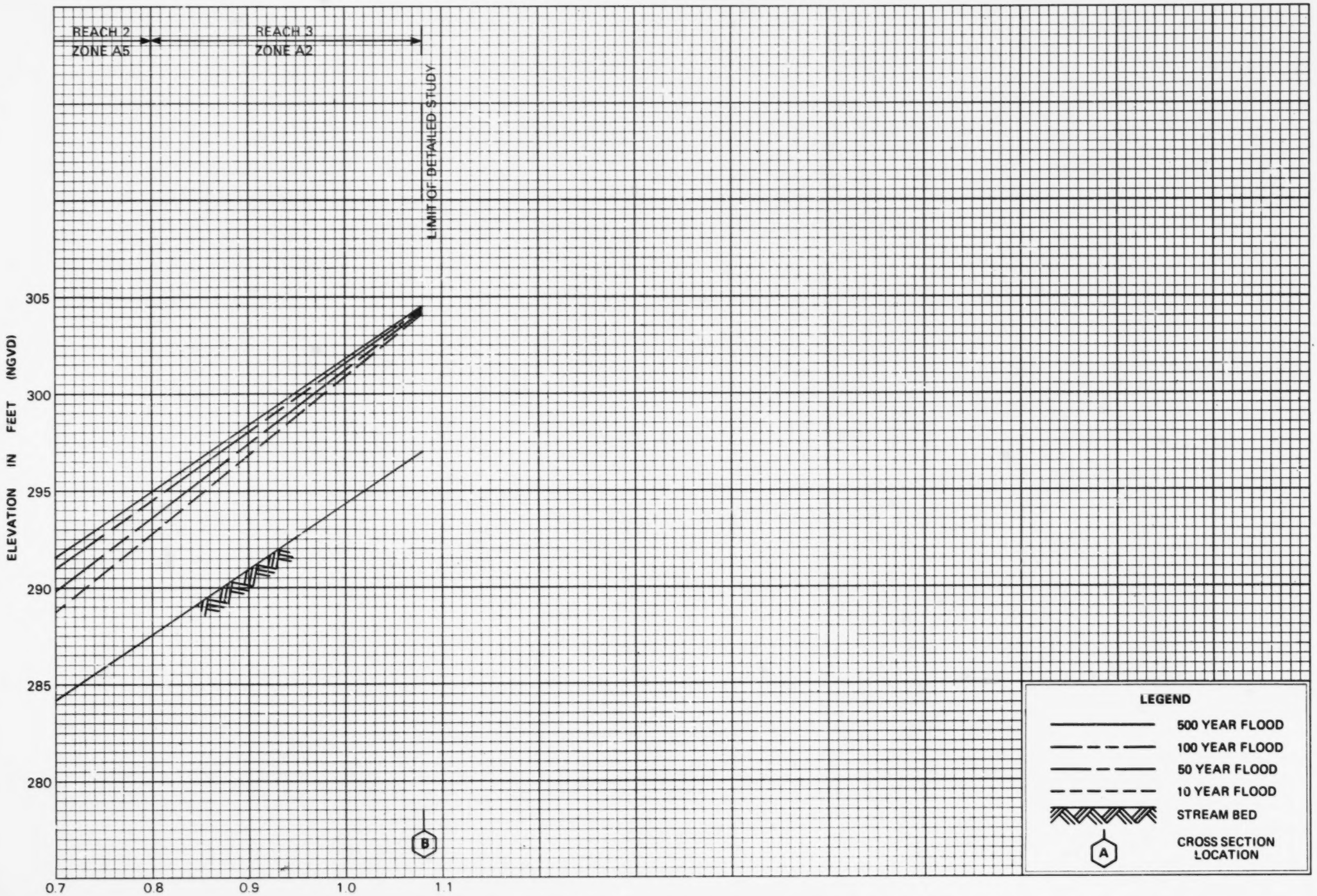

FLOOD PROFILES

TENMILE CREEK LATERAL A

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

27P

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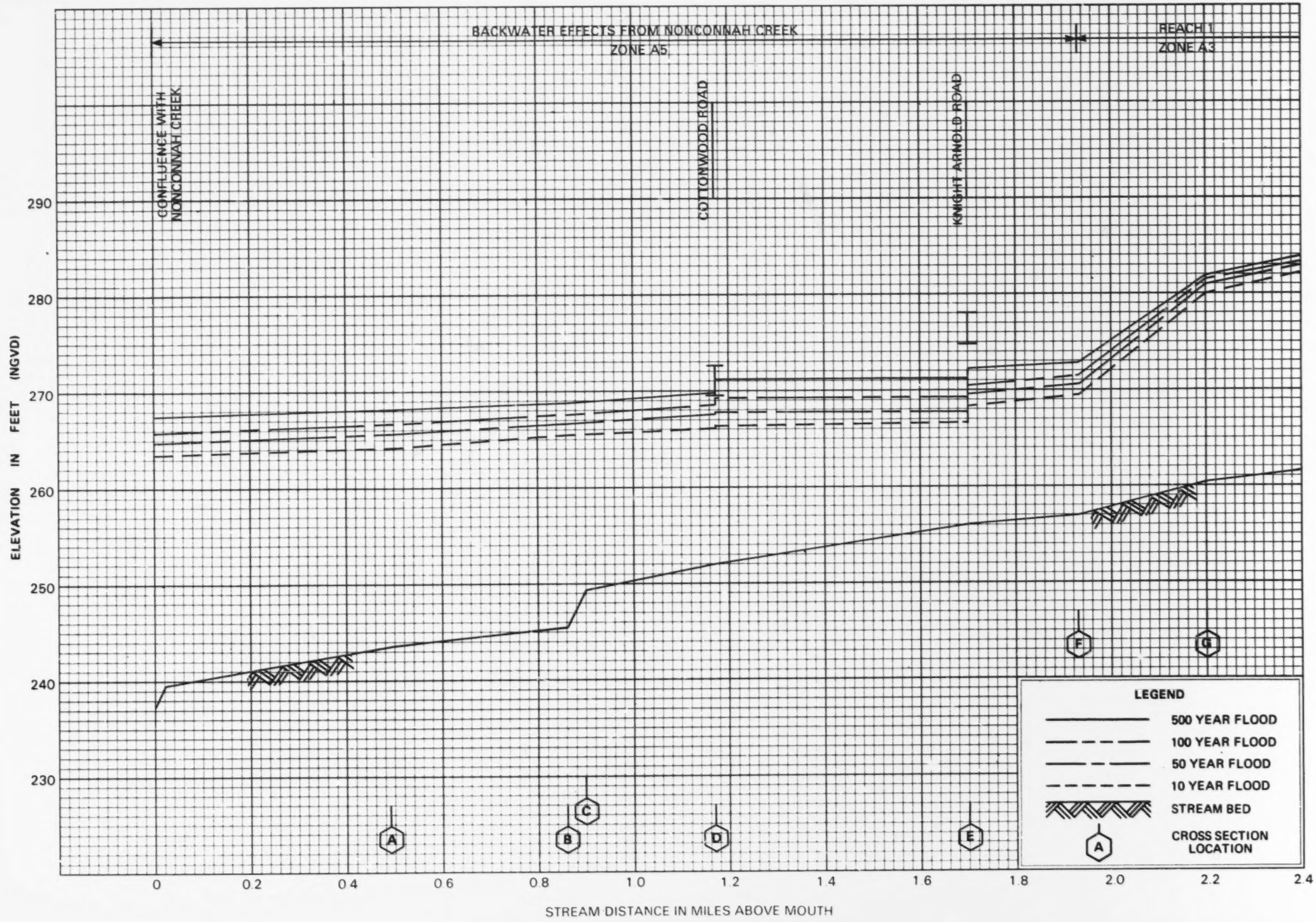

FLOOD PROFILES

JOHN'S CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

28P

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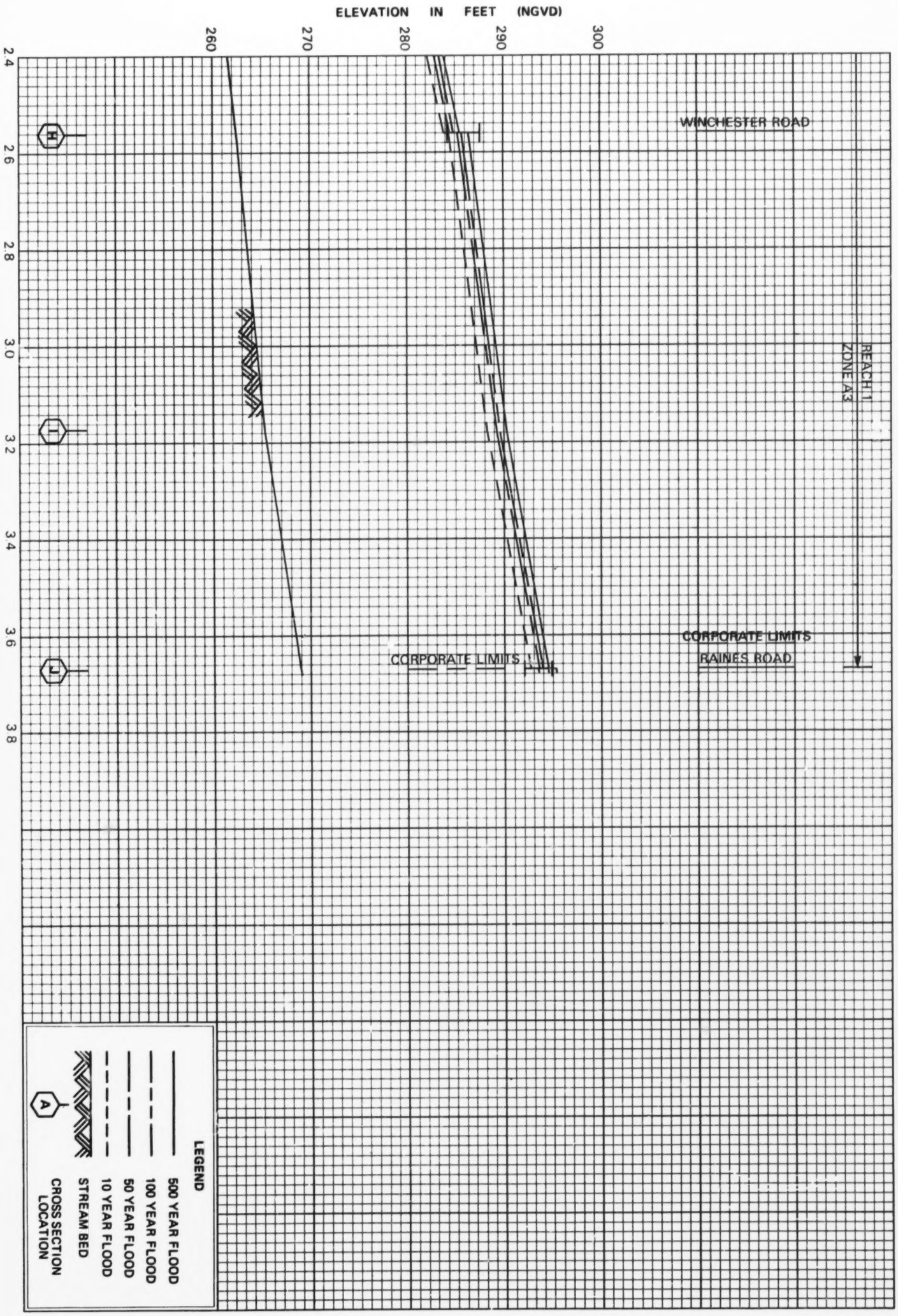
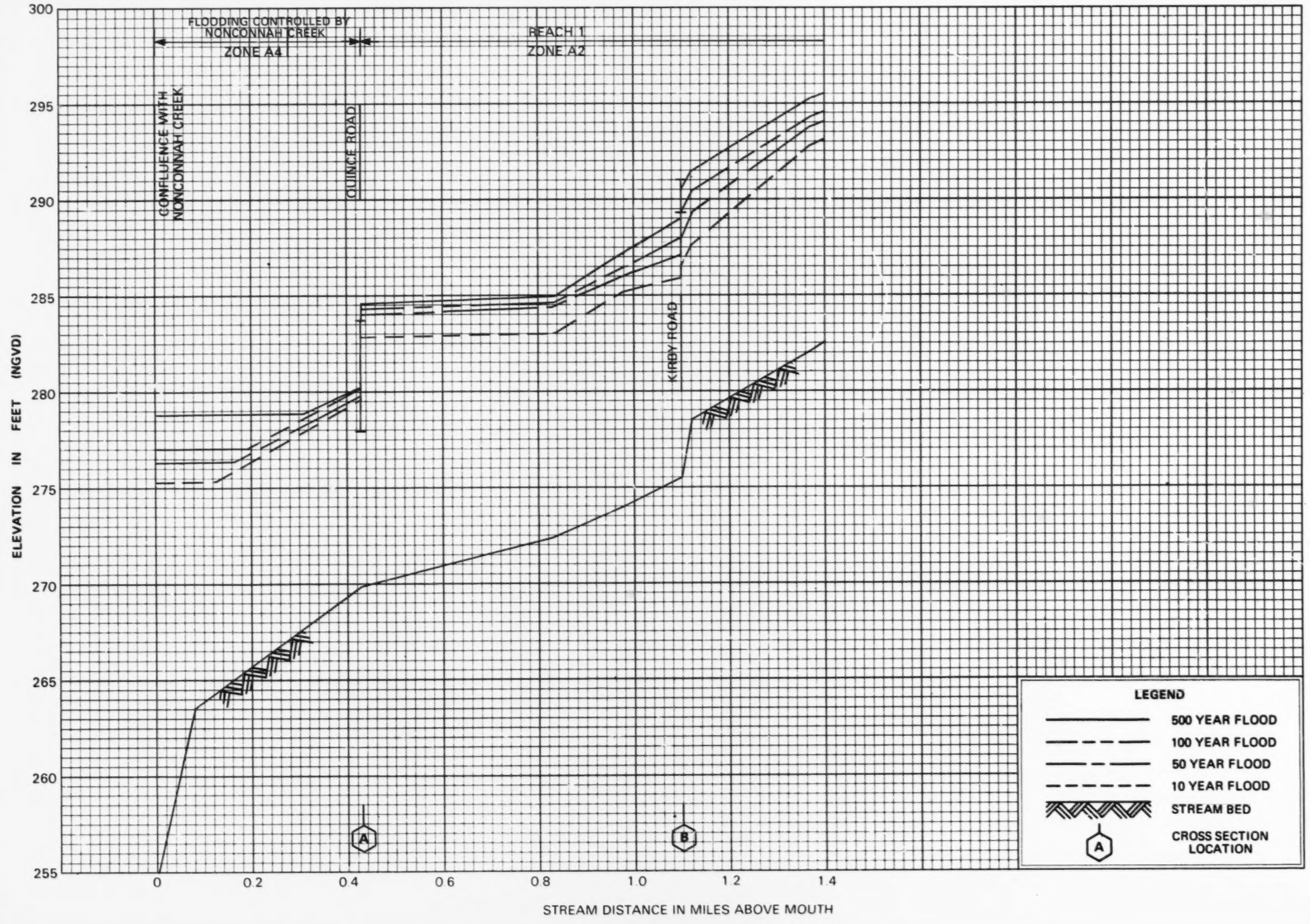


29P	FEDERAL EMERGENCY MANAGEMENT AGENCY CITY OF MEMPHIS, TN (SHELBY CO.)	FLOOD PROFILES JOHN'S CREEK

BEST DOCUMENT AVAILABLE



FLOOD PROFILES

HOWARD ROAD OUTFALL

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

30P

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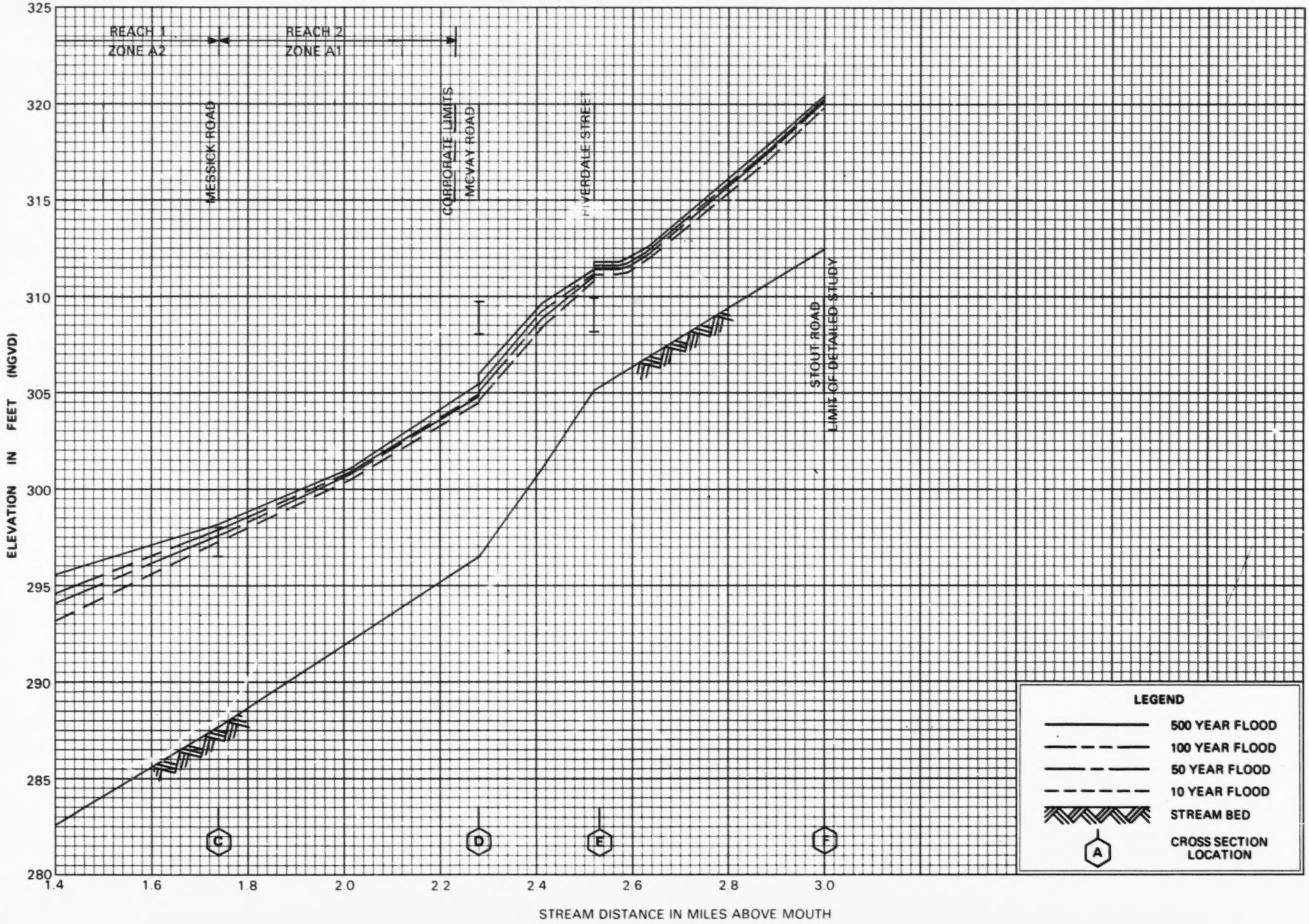

FLOOD PROFILES

HOWARD ROAD OUTFALL

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

31P

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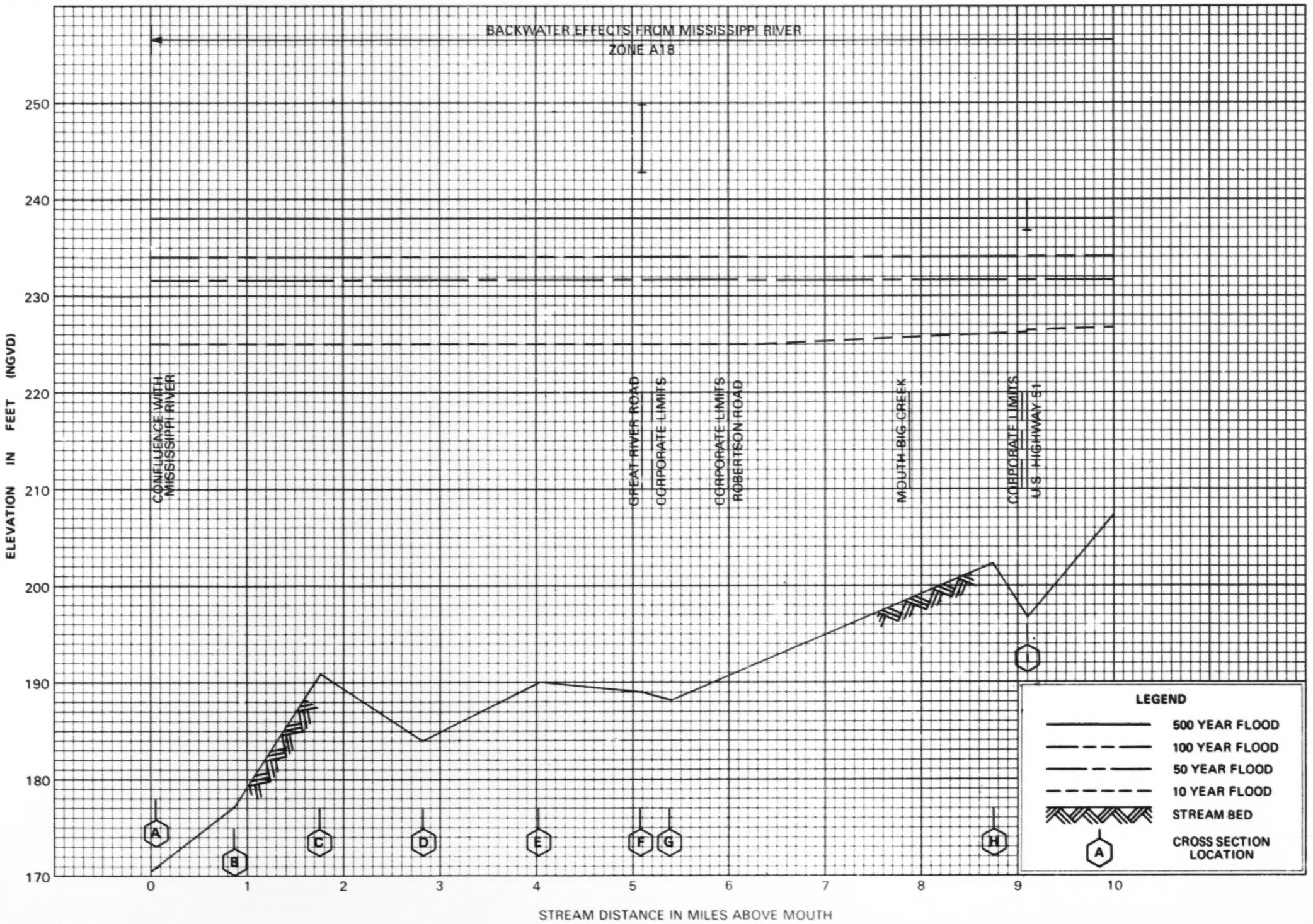

FLOOD PROFILES

LOOSAHATCHIE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

32P

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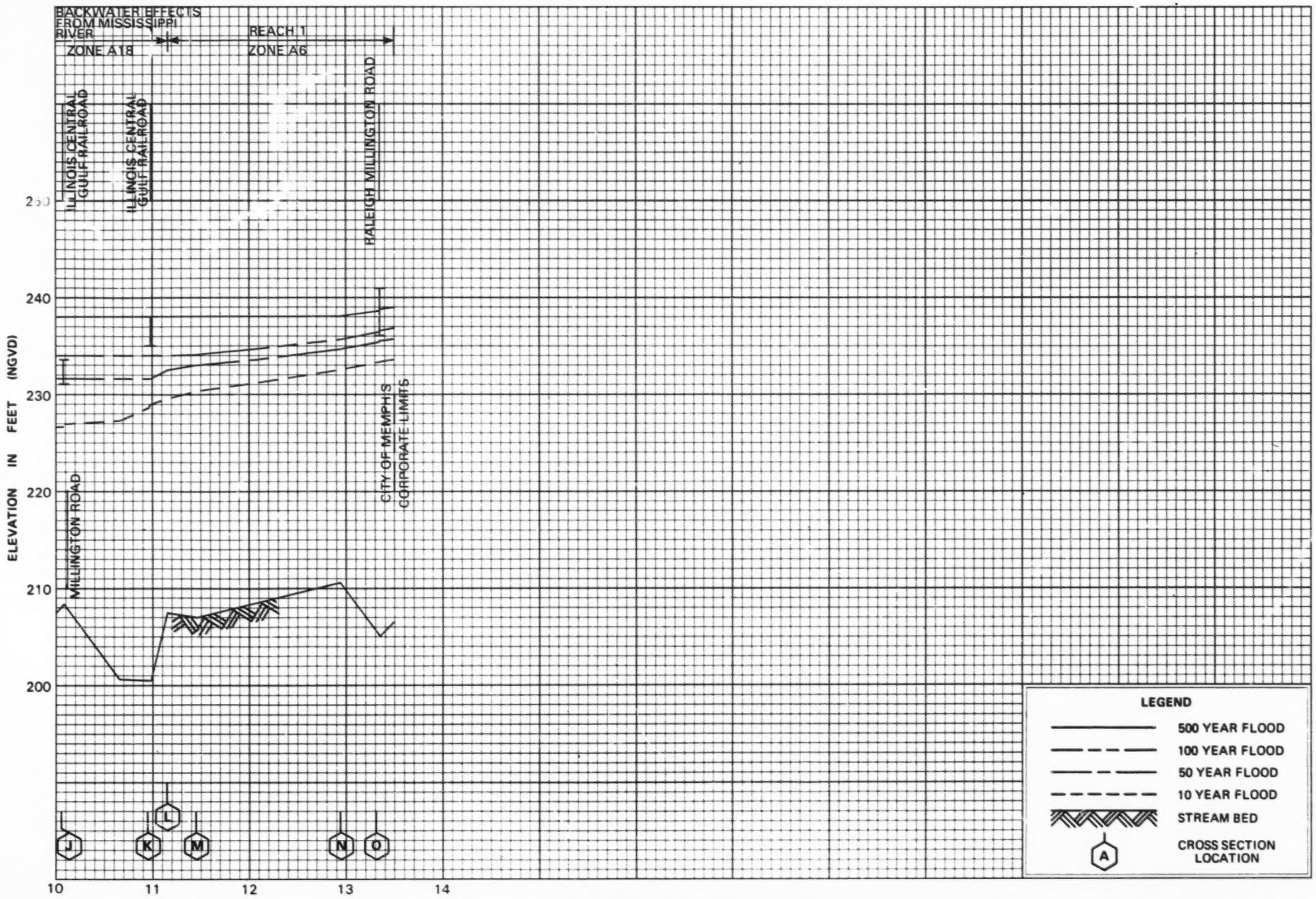

FLOOD PROFILES

LOOSAHATCHIE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MEMPHIS, TN
(SHELBY CO.)

33P

BEST DOCUMENT AVAILABLE